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P. H. & F. M. Root's Patent Improved Gas Exhauster.

In calling the attention of engineers and gas companies to the exhauster herewith illustrated, we desire to present the following points for consideration:

First—It is the simplest in its mechanical construction of any exhauster in use.

Second—All parts of the machine requiring attention, as the journals and gearing, are external, can easily be observed and attended to; the internal parts requiring no care.

Third—As the internal operating parts do not move in actual contact, but yet so closely as to be practically gas-tight, and as there are no valves sliding under pressure, the friction and wear are thus all confined to the journals and gearing, and are greatly lessened, and the power required to operate the machine is reduced to the minimum, and the durability is correspondingly increased.

Fourth—All parts of the exhauster, internal as well as external, are easily accessible.

Fifth—The construction of the machine is such that if from gross neglect or accident, repairs are needed, they can readily and expeditiously be made. By a peculiar arrangement of the journal boxes, the wear of the journals is provided for, and can be easily remedied, or new lining inserted. and the arrangement is such that in either case all the parts will be brought absolutely into their proper positions without any adjustment whatever.

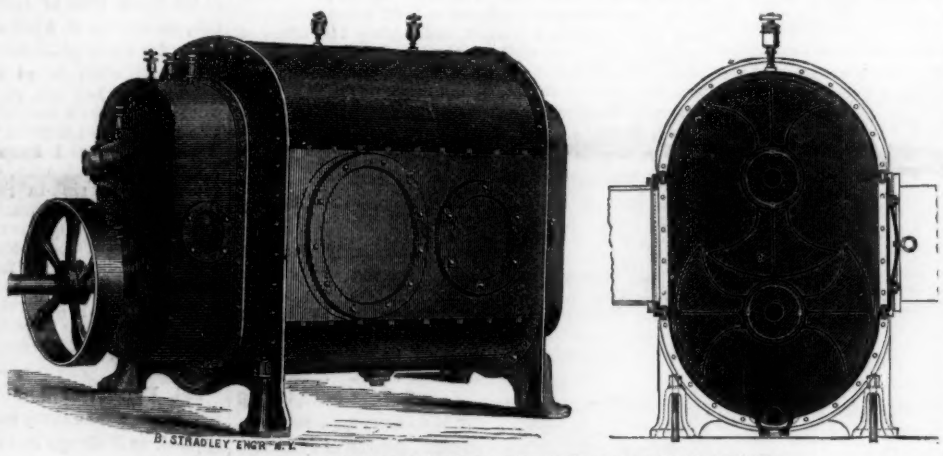
Sixth—The operation of the exhauster is not injuriously affected by the deposition of the tar and pitch on the internal operating parts of the machine, as is the case with others. The arrangement for disposing of the excess of tar is complete. They are built in the most complete and substantial manner with steel shafts, etc.; of any required capacity, large or small.

These exhausters have been in use for the last two years by the Manhattan Gas-Light Company of New York city, and are being put in by the Brooklyn Gas-Light Company, N. Y.

We learn that the manufacturers are now constructing exhausters for several of the largest gas companies in this country. They are also being introduced in England.

Gas companies desirous of obtaining these exhausters can address

S. S. Townsend,
31 Liberty street, New York,
General Agent for P. H. & F. M. Root.



P. H. & F. M. ROOT'S PATENT ROTARY GAS EXHAUSTER.

Intermittent Filtration.

Mr. Bailey Denton's system of downward intermittent filtration has been tested at Merthyr. The local paper remarks on the subject: "The public are by this time aware that the system of purification adopted on the land below Troedyrhiw is not irrigation, but a scheme devised by Mr. J. Bailey Denton, the engineer appointed by the Court of Chancery, which he calls intermittent downward filtration. Twenty acres of land have been parcelled out into four panels of equal areas. The whole piece has been drained to a depth varying from four to seven feet, the drains serving the double purpose of collecting and carrying off the subsoil water and the sewage water. The surface of each panel has been carefully prepared for the equal distribution of liquids. The sewage, after being turned on to the land, is left to find its way by percolation or filtration to the drains beneath, the theory being, that in its passage through such a depth of soil, by the time it drops into the drains it has become thoroughly purified—all its offensive solids being left behind, and the noxious elements held in solution being decomposed and absorbed by the deodorizing power of the soil, of which the sewage is thus made the incessant fertilizer.

The Commissioners first visited the adit of the sewer where the sewage is discharged into the distributing conduits, and half-hourly samples were taken for subsequent analysis. There was only a slight smell as the sewer was opened, and as the sewage flowed over the soil it disappeared—there being an entire absence of odor in walking over the beds. The crops now growing, consisting of turnips, mangolds, cabbages, savoys, Brussels sprouts, broccoli, and winter greens of various kinds, were really of magnificent growth, and excited the greatest interest in the visitors, who mentioned a fact of which it is to be hoped that somebody in this neighborhood may take advantage, namely, that the sewage farms near London not only supply their own neighborhoods with cabbages, but find a market for tens of thousands of them in Birmingham, and even send them so far as Manchester. After traversing the grounds, the Commissioners arrived at the outlet of the subterranean drains, where there was a large volume of the clearest water flowing—an undeniable proof of the efficacy of the system.

Samples of the water were taken at half-hourly intervals for analysis. It was said that the laborers on the ground quenched their thirst regularly at this stream, and by way of showing their faith in its purity, many of those present *tasted* the water, which has a strong chalybeate flavor, and certain indications of the presence of iron. But Dr. Paul has already analyzed it, and says in effect that it would be a boon to the Londoners if they could get drinking water of equal purity. To look at it, one might lay a wager that clearer water never flowed in the Taff."—*Mechanics' Magazine.*

In the case of the Fire Commissioners vs. Geo. L. Smith, of No. 40 East Broadway, for selling a dangerous burning fluid, called liquid gas, tried last week before Judge Fowler, of the Th rd District Court, the Judge yesterday rendered a decision against the defendant, sustaining the Fire Commissioners on all the points raised. This decision will have the effect of putting a stop to the sale of this highly-inflammable and dangerous article.—*N. Y. Times, April* 12.

The Williamsburgh Gas-Light Company, on the 25th of April, paid to the Clerk of the United States Circuit Court $1,500, the amount of three penalties to which they had rendered themselves liable, by failing to make returns to the Revenue Department, of gas furnished to the city between October 1, 1870, and November 1, 1871.

At the ruins of a malt-house, in the burnt district of Chicago, April 15, workmen came upon smouldering material, which burst into flames on exposure to the air. The fire had smoldered for six months.

Chemical Repertory.

No. 67.— May 2, 1872.
EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

243. Meet for Trial, at Least.—Meat is much better for family use when at least one week old in cold weather. The English method for keeping meat for some time has great merit. Experts say, hang up a quarter of meat with the cut end up, being the reverse of the usual way, by the leg, and the juice will remain in the meat, and not run to the cut and dry up by evaporation. It is worth a trial, and when made will be continued.—*Exch.*

244. Sulphide of Carbon.—F. Sestini.—From what is here published we learn that sulphide of carbon is not quite insoluble in water, for if the sulphide is agitated along with pure water for several hours, a perfect aqueous solution of the sulphide of carbon is obtained, which contains by weight 1 part in 1000 of water. When a mixture of water, of hydrate of lime, and of sulphide of carbon, is exposed to the action of the sun's rays, there is formed sulphocarbonate of lime, a reddish colored solid substance. As a very delicate test for sulphide of carbon, the author makes use of the aqueous solution of the sulphide, to which is added some solution of caustic potassa, and this mixture heated for five minutes to 50°; when the acetate of lead is added an abundant precipitate of sulphuret of lead is formed. The author states that by this test 1-10,000th part of sulphide of carbon may be detected.—*Gazetta Chimica.*

245. Action of Sunlight upon Olive Oil.—L. Moschini.—The main point of interest in this paper is that olive oil, in its natural state, contains in solution a yellowish colored substance, which, when acted upon by sulphuric acid (sp. gr., 1.63) and by nitric acid sp. gr., 1.33), gives rise to a greenish coloration, while, with caustic soda solution (sp. gr., 1.35), a bright yellowish coloration is produced. After exposure to sunlight this colored substance is so modified that the reagents alluded to do not produce the same reactions; moreover, by the action of the sun, the oleine of the oil is entirely altered, imparting to it many of the properties of elaidine, while, if the action of the sun's rays is very prolonged, there are free acids formed, and the olive oil becomes rancid.—*Ibid.*

246. To Polish Silver, Brittania, and Tin.—A lady for whose judgement we have the highest respect, says the *American Rural Home*, declares the following to be worth the price of that paper to all housekeepers in poor health. She accidentally discovered the effectiveness of the method awhile ago, has cleaned all her table-ware by it ever since, and says that very little strength is required, and that the polish is much the best she ever had:

Sprinkle freely, the best kind of dry zinc—No. 1, such as painters use—after rubbing it fine with a knife, upon a soft flannel cloth, or the top of an old woolen stocking will answer, then rub the silver, etc., with the cloth, then brush off with tissue paper, or any clean soft cloth or paper, and all will be as bright as new.

247. Great Rise in English Gas Coals.—The coal and labor questions constitute the great difficulties of gas companies at the present moment, and they call for most serious attention. We have repeatedly urged our readers to prepare themselves for a considerable rise in the price of coal; but we must confess that the rapid increase now experienced greatly surpasses the expectations we had formed. Our anticipations were based on the certain progressive rate of consumption: but at the present moment the quantity of coal raised is insufficient to meet the pressing demands of consumers, and this, together with a general rise of wages to miners, has caused a sudden and extraordinary rise in price. From a report of the Walker and Wallsend Union Gas Company, we learn that the advance in their district is more than 60 per cent., and in general it amounts to from 2s. to 4s. per ton. It is, however, so difficult to obtain reliable quotations that we deem it prudent to suspend for the present the publication of our usual gas coal price current, till the coal owners are in a position to quote prices.—*London Journal of Gas-Lighting, Feb.* 13.

[Since this date much greater advances are reported. We find the following in the same Journal, of March 26th.]

Coal continues at famine prices, the cost at Newcastle having reached 10s. 6d., and great difficulty is experienced in getting supplied at these rates. There can be no doubt that a very considerable rise in price will be permanently established, and reductions in the price of gas will be few and far between. It is curious to see that the large towns in the north have suffered more than the south from a short supply of coal. Manchester was placed for some days on a short allowance of gas, and Liverpool was reduced to the last extremity for coal.

248. The Oxyhydrogen Delusion.—Look on this picture:

The oxyhydric light has not proved a success in Paris, and it has been discontinued in the public lamps on the Boulevard des Italiens. It is not generally known that a carburetting apparatus is always employed in conjunction with the oxygen, which adds to the complication of the apparatus as well as the cost of the light. There are but few, remarks *Le Gaz*, who will consent to have installed in their houses two meters, two regulators, a carburettor, and two distinct systems of pipes. For this reason alone the system was certain to fail, even if the alleged economy were proved, which has never been the case.—*London Journal of Gas-Lighting, March* 26.

And then on this; (drawn some months previous;)

Oxhydrogen Light.—Rev. F. Moigno.—From the few particulars communicated in this paper we quote that, by the use of a gas-burner consuming 32 litres (1.13014 English cubic feet) per hour of the coal-gas as supplied in Paris, and burnt by the aid of 16 litres of oxygen, there is produced a light equal to that of the Paris standard burner, consuming 140 litres of coal-gas per hour, while, with the aid of oxygen, the combustion is quite complete, and very much less heat generated; it is further stated that this process is 20 per cent. cheaper than ordinary gas-lighting.—*Chem. News, from Les Mondes.*

249. Weight and Cost of U. S. Paper Currency.—The Secretary of the Treasury reports the following figures:

	Pounds.	Cost.
National bank notes	100,858	$78,669.24
Greenbacks	206,639	175,344.45
Fractional currency	319,176	243,406.94
Bonds	110,873	91,387.63
Internal revenue stamps	78,062	36,689.14
Total	812,608	$625,494.40

But this is not all. There is a reserve of paper to be manufactured into greenbacks, fractional currency, bonds, and revenue stamps, amounting to 257,183 pounds, costing $204,812.36; so that the grand total of paper used or to be used in our paper money, is 1,069,791 pounds, costing $830,306.76. It will give the reader some idea of the amazing bulk of our paper money, bonds, etc., to know that 535 tons of paper are required for their production.

250. Drainage of Mining Districts.—In 1865, the quantity of water raised from the mines of South Staffordshire was upwards of 50,000,000 gallons per day. At the same time one Mr. Marten reports that he ascertained, by careful observations of the average rainfall and the flow of streams in the district, that owing to the neglect of the surface streams and watercourses, which were intended to carry both rain-fall and pumped out water away from the district, a very large part of this daily quantity quickly found its way back into the mines; and there can be no doubt that the Birmingham and other canals very greatly contribute at the same time to the flooding of the collieries.—*Lond. Mining Jour.*

251. Gas for Removing Old Paint.—In buildings lighted with gas for this purpose nothing can be more economical, speedy, and free from deleterious effects for this purpose than a gas-jet. All that is required are a few yards of rubber tubing, arranged to suit one of the gas pendants. The tube can be held in the left hand, and the knife or chisel in the right. The jet or flame is then made to strike the surface, and, when the paint is warmed through, the knife is used quickly in removing it. The gas-jet does not give out a great amount of heat, and therefore does not injure the joints of the body, or draw out the oil from the wood to an extent that delays the after painting. In removing paint, the heat should never be so intense as to quickly raise it up into blisters, it is only necessary to warm it through.—*Coach Maker's International Journal.*

252. British Coal Exports in 1871.—These were heavy in December, having amounted to 993,053 tons, against 941,817 tons in December, 1870, and 928,993 tons in December, 1869. The exports to Germany declined with the advance of winter; but the shipments to France in December amounted to 226,479 tons, against 113,550 tons in December, 1870, and 207,814 tons in December, 1869. The exports for the whole of last year amounted to 12,816,434 tons, against 11,702,649 tons in 1870, and 10,744,945 tons in 1869. In these totals the exports to Germany figured for 2,397,869 tons, 1,603,749 tons, and 1,613,330 tons respectively; and those to France for 1,996,977 tons, 2,106,784, tons, and 2,017,855 tons respectively. The exports increased last year to Russia, Sweden, Germany, Holland, Italy, Brazil, and British India; but they declined to Denmark, France and Spain. The value of the coal exported from the United Kingdom in December was 538,667*l.*, against 472,382*l.* in December, 1870, and 452,161*l.* in December, 1969; and for the whole of last year 6,267,047*l.*, as against 5,638,371*l.* in 1870, and 5,165,668*l.* in 1869. In last year's aggregate Germany figured for 1,016,324*l.*, and France for 905,881*l.*—*London Mining Jour.*

253. Exploring for Coal.—The English geologist Jukes said "Very few people are aware of the enormous amount of loss which has been incurred, and is even yet of annual occurrence, in fruitless mining enterprises." "Sedgwick on a visit to Sir H. Halford, in the south part of Leicestershire, saw an engine, etc., on the top of a hill a few miles off, and was told it was for a coal pit. He naturally went to look, and going up the hill found lias shale with lias fossils. 'Truly (says he) this is lias.' 'Lias (says the proprietor), you are a liar, and you are all liars together.' The man ruined himself." "In South Staffordshire (says Mr. Jukes) I know two instances of ground bailiffs, intelligent men, well versed in coal getting, continuing to sink in Silurian shale, and heaps of the fossils of that formation lying on the pit bank; they were still going down for coal." Jukes continues: "The names of these stories are legion. The money wasted in this century for the want of the very rudiments of geological knowledge in those who wanted it, would have paid for the whole Geological survey and museum since its establishment, and given it an endowment of £2,000 forever.

254. Utility of Scientific Discovery.—Who can tell what a discovery may bring forth? *Cui bono?* applied, as it always is, to a new fact, is as silly as the reply of Colcridge to it was wise. Being asked *what was the use* of a particular new discovery, he retorted "what is the use of a new born child?"

255. The Sun All Gas!—According to the theory of Faye, the great French scientist, the existence of ascending currents everywhere proceeding from the sun's center to its surface, is an imperative proof that instead of a fused liquid mass, the body of the sun must be in a gaseous state, and is an immense sphere of æriform matter of an enormous temperature, but which is continually cooling by the action of the ascending currents. The sun is absolutely spherical.

256. Morbific Germs.—The destruction of the excreta from cholera patients must be insisted on under the heaviest penalties, and a system of inspection adequate to enforce this provision must be organized. Without these preliminary safeguards we cannot hope to resist the enemy with any success. So long as the germs of the disease are allowed to pass through the sewers into the rivers, to be washed up by the tide against our seaside villages, to be wafted about our streets in the form of an impalpable dust, we cannot hope for any good results from sanitary measures of the ordinary kind. Cleanliness, ventilation—above all a pure water supply, are advantages which cannot be over valued. But until the germs of disease are systematically destroyed and excluded from any mingling with the air we breathe and the water we drink, nothing will control the ravages of cholera.

Every other precaution is subordinate to the main preventive measure, which it will need special powers to carry into effect—the destruction of the cholera germs before their diffusion.—*E. C. C. Stanford.*

257. SAVE THE BABIES.—On good authority it is promulgated abroad that two drops of turpentine oil in a little milk, is a complete antidote to phosphorus poison. Children not unfrequently bite off the charged end of phosphoric matches and swallow them. It is stated that a girl was recently saved in England by this newly discovered remedy. who had actually eight match ends in her stomach.—*Scientific Press.*

258. THE NEW GOLD FIELDS.—General Hancock forbids mining expeditions into the region of the Black Hills, for the reason that, firstly, the gold there belongs to the Indians, and, secondly, there is no gold there at all.—*Daily Paper.*

259. DESTROYING MOULD IN CELLARS.—According to Dr. Weidenhold, fungous growths in cellars may be combated either by burning sulphur or by pouring two parts of concentrated sulphuric acid over one part of common salt. In the first instance, sulphurous acid gas is produced; and in the second, hydrochloric acid, by means of which the fungi are destroyed. It is sufficiently evident, however, that during this process all openings must be closed, so as to prevent any escape of the gas, and the greatest care exercised not to enter the cellar after the operation until it has been thoroughly ventilated.—*Sci. Press.*

260. THE GREENLAND METEORITES.—At the Geological Society of London a communication from Prof. Nordenskjold was read, in which the author stated that the masses of meteoric iron brought from Greenland by the recent Swedish expedition seem to have formed the principal masses of an enormous meteoric fall of Miocene date, extending over an area of some 200 miles. The iron appears to be free from silicates. Against its eruptive origin the author urges that when heated it evolves a great amount of gaseous matter, and that it contains imbedded particles of sulphide of iron, the mass itself being nearly free from sulphur. The masses are composed of meteoric nickeliferous cast and wrought iron, or of mixtures of the two: in the last case the Widmannstætten's figures are best developed. The author further noticed the various modes in which the iron occurs:

1st, as meteorities; 2d, filling cracks; 3rd, as brecci-form stones cemented with oxide of iron; and 4th, in grains disseminated in the basalt. Mr. Roberts protested against the evolution of gaseous matter being considered as a proof of meteoric origin- Prof. Ramsay reiterated his previously expressed opinion, that the masses of iron might be of telluric origin.—*Lond. Mining Jour.*

Copper Gas Pipes.

The *Journal de l'Eclairage* notices an accident which once more proves the danger of using copper gas pipes. On the 21st of April last, a workman having, with a triangular file, cut almost through half the diameter of a gas pipe of red copper of ⅜ inch interior diameter, which supplied the Liege station, was removing the tool when an explosion similar to the report of a rifle ensued, and the workman was much burnt.

A similar incident happened the other day, with less intensity, however; and the workman, who was not injured, did not report the circumstance. Some gas pipes having been taken down, they were found covered with a blackish coating, and they showed evident signs of corrosion from ammoniacal condensation.

The black matter was analyzed, and was found to consist of an acetate of copper, which exploded between 203 and 248 deg., producing water, copper, carbon, carbonic acid, and traces of carbonic oxide.—*Scientific American.*

[The absurd error in the above, consisting in calling *acetylede of copper* "acetate," we have already called attention to and corrected. But while the item itself is on its travels, and is going the rounds of the civilized world, our correction remains unnoticed. "Give a lie ten days start, and the truth will never catch it.—ED.]

On the History and Manufacture of Petroleum Products.

A Memoir, communicated to the Society of Arts, Massachusetts Institute of Technology, March 14, 1872.

By S. DANA HAYES.

State Assayer and Chemist for Massachusetts, Etc.

[Communicated to this Journal by the Author.]

PETROLEUM PRODUCTS.

By referring to any authentic shipping-list, the number of thousand gallons of crude and refined petroleum sent away from the United States every day and week may be ascertained; and very little search in this direction develops statistics that are surprising to persons previously unfamiliar with them. As, for example, the total value of the crude and refined petroleum exported last year (1871), estimated at a low average value of twenty-five cents per gallon, amounts to nearly *thirty-five millions of dollars*, in one year. And it is especially notable, that a considerable proportion of this material is classed as "refined," and consists of products manufactured from the crude petroleum of the wells, before shipment. There is certainly no other article of commerce exhibiting similar statistics of production and manufacture among the industries of this country.

The object of this memoir is to briefly sketch the history and present condition of the manufacture of petroleum—a manufacture which is of great importance, and which, after the diligent study given to it, and under skilful management, yields products superior to those obtained in Europe, and elsewhere, from the same crude material.

The literature of this subject is at present exceedingly meagre, and generally in short articles, not always trustworthy, distributed through many journals and publications of different kinds; and very little correct history can be compiled from any records, excepting those of the Patent Office. But as the industry itself is not, at most, more than eighteen years old, we find, in the experience of practical chemists and manufacturers, a fund of very valuable and interesting information relating directly to the subject.

Having had uncommon opportunities for making myself familiar with the manufacture of petroleum products, after careful investigation, and in the correspondence of others, I find it generally acknowledged that to Mr. Joshua Merrill, manufacturing chemist of the Downer Kerosene Oil Company of Boston, more than to any one else, belongs the honor of bringing this manufacture to its present advanced state; and, as an account of his labors and discoveries in this connection would provide a nearly complete history of the art, I take pleasure in recording some of them in this form.

COUP OIL.

The first coal-oil made for sale in this country, was produced at the works of the United States Chemical Manufacturing Company in Waltham, Mass., by Messrs. Philbrick and Atwood, early in the year 1852. It was made, in connection with picric acid, benzole, and other products, from coal-tar; and was named, by Luther Atwood the inventor, "Coup Oil," after the *coup d'etat* of Louis Napoleon, which had taken place a few months before.

This was a lubricating oil for machinery, of which a hundred and seventy-five gallons were made. It was used by many of the largest factories and railroads, and at the time was so highly esteemed, that Messrs. Atwood and Merrill were employed to make and sell it in Glasgow, Scotland, for Messrs. George Miller & Co., in 1855 and 1856. But, if compared with a neutral hydrocarbon lubricating oil of the present day, it would be considered entirely unmerchantable, on account of its very offensive odor and other comparatively poor qualities.

EARLY EXPERIMENTS.

In 1856, Mr. Samuel Downer, who had previously been a successful sperm and whale oil merchant, erected buildings in South Boston, and employed Mr. Merrill to manufacture hydrocarbon oils for lubricating purposes especially; and a great many experiments were tried there, on a manufacturing scale, with different forms of apparatus; and to determine the most suitable crude material from which to make these oils.

About four hundred tons of Trinidad bitumen, and one hundred tons of Cuban "chapapote," were consumed, and converted into lubricating and burning oils, during these early experiments. The experience gained in this way, and the many difficulties then overcome, proved of great service in the latter operations at these works.

THE FIRST ILLUMINATING OIL.

Light coal-oil products appear to have been used by individuals in this country, for illuminating purposes, previous to this time; but upon the introduction of the Knapp and Deitz lamps, which were originally designed for burning resin and other oils, it was found that some of the light hydrocarbons obtained from these West Indian bitumens burned freely in them, yielding a bright and beautiful light as compared with that from the animal oil lamps and candles previously in common use. This was an important advance, and inaugurated the general burning of these hydrocarbons in lamps, in this part of the country; the first illuminating oil having been made by Mr. Merrill, from Trinidad bitumon, in 1856.

ALBERTITE PRODUCTS.

In the spring of 1857, the first attempts to use the Albert coal, from Hillsboro', New Brunswick, as a source of lubricating and illuminating hydrocarbon oils, were made at South Boston. But the condensing apparatus, which had been used when distilling other coals and bitumens, was found to be unsuitable for this new material, as a black asphaltum-like substance passed bodily over out of the retorts, and often closed the cooled pipes of these condensers. This difficulty was only overcome after six months spent in experimenting by Mr. Merrill, who then invented an atmospheric condenser, which, being constructed of large hollow disks, allowed this tarry distillate to pass through, with the more liquid hydrocarbons, from which it was separated afterwards. With this improved apparatus, the Albertite proved such a valuable material, that, in the fall of 1857, six retorts, each having a capacity for 1200 pounds of coal, were erected in the open air, with the new condensers attached, and together yielded about 360 gallons of crude coal-oil in twenty-four hours. Twelve more retorts were soon added to these six, out of doors. After Mr. Downer had made contracts with the Albert Mining Company for a regular supply of their mineral, thirty retorts were erected in a substantial building; and these were followed by twenty more, the first eighteen having been worn out and removed. These fifty retorts were used for more than four years, and produced at the rate of 900,000 gallons of crude, or 650,000 gallons of refined oils each year—quantities very much larger than were anticipated, when the first experiments were made, in 1856.

A very large part of the products from this Albertite mineral, were hydrocarbons used for lubricating purposes; and their acknowledged excellence was entirely due to the untiring labor and skill of the manufacturing chemist. It is almost impossible for persons unfamiliar with the distillation of this mineral to realize at the present time, when similar processes are in common operation, how many obstacles there were to success in these early days. Many of the best forms of steam-distilling, and other apparatus now in use, were employed and perfected then.

"CRACKING."

One observation made by Mr. Merrill during the manufacture of Albertite products, became of such practical and scientific importance in after years, that it is worthy of especial description here.

The light or "thin" products, afterwards used as illuminators, were for a long time unmerchantable, and the production of them was undesirable; but it was observed that every time the crude coal-oils, or the heavy lubricating oils made from them, were distilled, these thin, light-colored hydrocarbons were invariably produced at first by the distillation, although the oils in the apparatus had been previously fractioned with great care.

This caused so much loss of material, that every endeavor was made to prevent it; such as surrounding the upper part of the stills with heated flues, and covering their tops with sand, or other poor conductors of heat. But these efforts to prevent the decomposition, only served to demonstrate that any distillation of these hydrocarbons is necessarily *destructive*, and that the light distillates were produced by condensation of vapors in the upper part of the distilling apparatus, which, falling back into the body of the heated fluid, to be again raised in vapor, were thus decomposed, with the deposition of carbon, into lighter and thinner hydrocarbons. Further experiments showed that these hydrocarbons could be so easily decomposed, that the *continuous* production of light distillates having a specific gravity of about 818 (42 deg. Beaume) was effected from hydrocarbon oils having specific gravity of 880 (30 deg. Beaume) in an apparatus holding a thousand gallons, by properly regulating the heat applied; the other products being only uncondensed gases, and deposited carbon left in the apparatus at the end of the distillation. These light distillates became valuable for use in lamps some time

afterwards, and the manufacturer's difficulty was thus removed; but the unstable nature of these hydrocarbons, and the ease with which they may be "cracked," was practically demonstrated when endeavoring to overcome an annoyance.

KEROSELENE.

Any account of the Albertite products would be incomplete without mention of the lightest naphtha obtained from it, which was known as "keroselene." This was made by Mr. Merrill in 1857, just after the first successful distillation of the New Brunswick mineral; and it was used in considerable quantities for supplying carburetted air or automatic gas machines, which would have been useless at that time without this material. It was obtained in a crude condition by carefully refrigerating the waste gases as they passed from the outlets of condensers attached to the stills and retorts; this crude material, after agitation with sulphuric acid, was redistilled by steam heat; and the exceedingly volatile keroselene, having a specific gravity of only 634, and which boiled at 85 deg. Fah., was manufactured in this way.

Mr. Merrill first noticed the anæsthetic effects of keresolene, upon a laborer engaged in cleaning a tank or cistern which had contained it, at the works; and afterwards he experimented further with it, upon rats and mice. This discovery of its anæsthetic properties was recorded in the medical and surgical journals of that time, and many interesting results were obtained with it by different members of the medical profession.

PETROLEUM.

I have been unable to find any record of the first distillation of American petroleum, taken from the wells, in a large way; although it was investigated, and the distillates obtained in the laboratory were burned experimentally, quite early. But Pennsylvania petroleum was not, probably, made into illuminating oil, for sale, before the fall of 1858; although there were fifteen establishments using petroleum exclusively, in the United States, by the fall of 1860.

During the years 1858 and 1859, several hundred barrels of petroleum were brought to Mr. Merrill from surface wells; and, on one occasion, a considerable quantity was sent to him for distillation from the famous Tarentum well in Pennsylvania. And afterwards the heavy paraffine oils and residuary products from western establishments, which were considered valueless there, were manufactured into lubricating and illuminating hydrocarbon oils, at the works in South Boston. As the supply from flowing wells increased, the use of Albertite, as a source of fluid hydrocarbons, gradually diminished; although it was not abandoned until 1865.

After the trying experiences of former years, no difficulty was encountered in converting crude petroleum into naphthas, burning oil (called kerosene or "wax-oil,"—a patent trade-mark name), lubricating oil, and paraffine, similar to those made from coals and bitumens. Petroleum breaks up into thin hydrocarbons, by distillation, even more readily than the Albertite products: and, when large demands are made for burning oil, the distilling apparatus is operated slowly, or modified in form, so that the condensed vapors of the petroleum, or heavy oils, obtained from it, are repeatedly heated, by being returned into the body of the still; and in this way the yield of the lighter hydrocarbons may be increased at will, the whole contents of the still being converted into burning oil when desirable. This principle is applied to the immensely large wrought-iron stills, holding 2000 barrels. or 80,000 gallons each, that are now frequently used; they are placed over a number of small fireplaces, with the top and upper part of the stills exposed to the outside atmosphere, for the purpose of condensing and returning heavy vapors in the stills.

Petroleum yields, by distillation, nine distinct commercial products.

Name.	Specific Gravity.	Beaume Scale.	Boiling Point.
Righolene.....	625		65° "
Gasolene.....	665	85	120° "
C. Naphtha.....	706	70	180° "
B. Naphtha.....	724	67	220° "
A. Naphtha.....	742	65	800° "
Kerosene Oil.....	804	45	350° "
Mineral Sperm Oil.....	847	36	425° "
Neutral Lubricating Oil	883	29	575° F.
Paraffine.....	848(?)		

[To be concluded.]

"RAPID TRANSIT" FROM THE COAL MINES.—The bill authorizing the extension and consolidation of the railroads from the Highland Suspension Bridge, westward, passed the Senate April 17, and has gone to the Governor without amendments. Should this bill become a law, the companies interested will be enabled to bring coal direct from the mines into New York and the New England States without breaking bulk. It is said that the recent combinations in New Jersey and Pennsylvania are in this movement, with a view of making the bridge parts of a great through line.

Tue Mutual Gas-Light Company.

COAL GAS ENRICHED WITH NAPHTHA—DESCRIPTION OF THE MUTUAL GAS-LIGHT WORKS.

[From the New York *World*, April 13.]

A gas company that possesses such great works as those of the New York Mutual Gas-Light Company, and has already laid some ten miles of main-pipes through some of the principal streets of New York, and whose gas is made by a new process that promises to greatly cheapen gas-light, is worthy of something more than mere mention in these days of bitter complaints against the gas companies. The gas is made partly from coal and partly from naphtha.

This company will be supplying a large portion of the city by the 1st of May; its works extending from Eleventh to Thirteenth street, and from Avenue D to the East River, and covering eight acres, being now in working order. During the past season, and until the frost prevented further operations, it was engaged in laying its pipes, which extend in various directions from Canal street to Fiftieth street and from Eighth rvenue to the East river. Early in May its mains will reach Broadway, through Chatham street and Park Row. The mains are from two feet to four inches in diameter, the average being about twelve inches. They have been laid in Third, Fourth, Fifth, Sixth, and Eighth avenues, and in the Bowery and Greenwich avenue, the latter being a cross connection. The other cross connections are through Twelfth and Twenty-first streets. There will be another soon through Twenty-second street. The pipes run now in Third avenue, from Twelfth to Fifteenth street; Bowery, from Twelfth to Canal street; Fourth avenue, from Twelfth to Bowery; Fifth avenue, from Twelfth to Twenty-third street; Sixth avenue, from Twenty-first to Forty-third street; Eighth avenue, from Greenwich avenue to Thirty-fifth street. Hundreds of service pipes have been laid, and negotiations have been completed for lighting many of the principal hotels and theatres, including the Fifth Avenue and Grand Opera House. The company have been disappointed in their expectation of being able to lay pipes all winter, having been hindered by the severe frost. This too, has compelled them to leave the streets unpaved in many places; but they have now thirty gangs of pavers employed, and have that work nearly completed on the streets already supplied with pipes.

THE NEW GAS IN BROOKLYN, COLUMBUS AND DETROIT.

The history of this new system of lighting is as follows: About three years ago Dr. Leonard Gale and A. C. Rand, an extensive oil merchant and refiner, invented this process for at once utilizing the otherwise dangerous naphtha and supplying a cheaper and better gas. It has been in use for six months in South Brooklyn by the Citizens' Gas-Light Company, who have had two "benches" (series of ovens containing retorts) in use with good success, and are getting more benches ready. The system has also been in operation for six months in Columbus, O., and is now being established in Detroit. Applications for rights to use it are coming from various quarters.

An interesting report concerning this gas has just been made by T. G. Wormley, State Gas Commissioner of Ohio, to the City Council of Columbus O. The main points of his report are these: Examinations extending over a period of twelve days indicate that during that period the gas had an average illuminating power equal to 20.64 candles; that is, that the gas, when burned at the rate of five cubic feet per hour, gave on an average as much light as 20.64 sperm candles, each consuming 120 grains of sperm per hour. The statute relating to this subject fixes the illuminating power at twelve standard candles. The average of the sulphur found in the gas was 6.12. The averages in London, made at eight stations last year, ranged from 16.21 to 33.30 per 100 cubic feet of gas. The ammonia was scarcely noticeable at the Columbus works—8-100ths of a grain; carbonic acid gas, 60-100ths; vapor of water, 82-100ths; free oxygen gas, 90-100ths. These proportions of carbonic acid gas and vapor of water thus found were about the same or a little below the quantities usually present in illuminating gas, but the proportion of free oxygen was much above.

The works of the New York Mutual Gas-Light Company, which gives promise of affecting very much for the better the interests of hundreds of thousands of our citizens, are well worthy of inspection. On the river side of the eight acres covered by the works are the coal sheds, capable of containing 30,000 tons of coal. On the Eleventh street side are the offices of the company and the coke yard. On the Avenue D side are the four great gas-holders, already completed, and capable of containing 265,000 cubic feet each. On Thirteenth street are the foundations of three more gas-holders and the naphtha reservoir. The latter is made of half-inch boiler iron, fastened with hot rivets, and is steam proof. In the centre are the purifying and retort houses.

The process by which naphtha, usually so dangerous, is converted into as harmless an illuminating gas as that produced directly from coal, is as follows: The liquid naphtha flows from the reservoir to the retort house, where it is received in four stills, within which steam pipes are run in all directions. The effect of the heat from the steam pipes is to vaporize the naphtha. These stills are supplied with safety-valves. The vaporized naphtha passes next to a row of clay retorts, forty-eight in number, similar to those used for making ordinary coal gas, except that they are double. In the same building there are 240 retorts for making the coal gas that is to be mixed with the naphtha gas. The passage of the vaporized naphtha through and over the red-hot retorts converts it into a permanent rich illuminating gas, the same as that from the best Australian cannel coal. It passes from the retorts to the building containing the "condensers," thence to a large station meter in the office, and thence to the gas-holders, where it first comes in contact and mixes with the common coal gas.

The gas contained in the coal has to pass through many more processes than that found in the naphtha; but as these process have often been described they need only be enumerated here. The coal is thrown into the retorts. The gas eliminated passes from these through a pipe to the building containing the "condensers" and a singular series of "scrubbers"—immense reservoirs wherein it comes in contact with falling water; thence to the "purifiers"—tanks where it is purified by chemical action—and thence to the "station meter," preparatory to its mixture with the naphtha gas.

The offices of the company are well arranged. On the ground floor is the main office for clerks, etc. In the rear end of this are the two beautifully ornamented station meters (one for coal gas and the other for naphtha gas), each capable of passing 2,400,000 cubic feet of gas to the holders in twenty-four hours. Standing in front of these is the "pressure register," which registers the pressure on the street mains, and is quite a work of art. If the man who is in attendance in the "governor house" is derelict in regulating the passage of gas to the streets, this faithful register indicates the fact at once on paper. The other offices are the chief engineer's room, the draughting room, the photometer room (perfectly dark), and the storeroom.

The whole establishment shows the handiwork of men who have spent their lives at the business, and is in excellent order. The great question is—Will they fulfil their promise to give New York better gas than ever before used here, and at cheaper rates than those at which it is now supplied? They say that it is their intention to remain independent of all other companies, and to rely upon the patronage of the public, and extend their pipes wherever they are encouraged to do so. "The terms upon which consumers will be served will be to charge for gas actually consumed. There will be no charge for service pipes or rent of meter." These are fair promises; but the "Mutual" has mighty competitors, who now control the field, as follows: The New York Gas Company light the city from the Battery to Grand street; the Manhattan Company from Grand to Thirty-fourth street; the Metropolitan from Thirty-fourth to Seventy-ninth; the Harlem from Seventy-ninth north. The present chaotic condition of municipal affairs is favorable for a new enterprise of this sort, and it is to be hoped that it will result in cheap, good gas, and honest bills for the same.

CALIFORNIA will soon need no more Eastern assistance. There arriqed in this city, April 16, by way of the Union Pacific Railroad, a car-load of fresh roll butter, weighing 20,328 pounds, most of it done up in a neat, compact form, enveloped in snow white linen, and packed in brine in iron-bound tierces. The butter has been on the road twenty-three days, and has the rich yellow appearance and delicate flavor of our June dairy. This is the first consignment of butter ever received in New York from the Pacific States, and will have a decidedly beneficial result on the market, as it is not two years ago that we sent more than double this quantity to California.

Great Gasometers.

THE HUGE GAS-HOLDERS OF ENGLAND AND AMERICA—INTERESTING FACTS AND FIGURES.

[New York *Times*, April 7.]

It does not necessarily follow that where there is the most gas, there must also exist the greatest quantity of light; and it is to be regretted that statistics show so large a proportion of instances where gas-holders, inexhaustible in their respective capacities, afford an article that possesses the very reverse of illuminating qualities. These latter are peripatetic gas-holders, generous in their effusions, but as mystifying in their effects as a London fog. Congress, Legislatures, the hustings, and even Courts of Justice; are sadly plagued with them. But the gas-holders to be treated of here come under a different category, and may be distinguished from the list of perambulating gas-holders by the label "useful articles." They are clad with iron instead of adipose, and beside that, they are always found right in their proper place, and do their work silently—great slow-breathing monsters, guiltless of ebriety, whose purified exhalations cheer up many a home-circle and light the path of the late wayfarer. Everybody in these modern days, living within the pale of civilization, knows what is meant by a gas-holder, frequently called gasometers, because they formerly also measured the gas—an office now performed by separate meters.

Of late years, either from a spirit of emulation or from local necessities, some of these holders are made enormous in their dimensions. To the untutored eye they present the appearance, when fully distended, of circular castles or forts, without port-holes, embrasures, or sally ports, or to the less military mind they might suggest sections of two enormous boilers, one sliding within the other, and set vertically in a big round tank sunk in the ground. This tank contains sufficient water to prevent the gas from escaping under the edge of the holder. When exhausted, the sections slide one within the other, like a telescope when shut up, and the whole affair sits down in the tank so that the top is nearly on a level with the surface of the ground. As the gas is let in and the pressure increases, the huge iron cylinders rise up and the inner one slides up until the holder is fully extended. These are called telescopic holders. Some are made with only a single section, or "single lift," as it is called. The average dimensions of holders approximate seventy feet in diameter, with a height of about 60 feet, and a capacity of less than 850,000 feet. The largest gas-holder in the world, previous to 1857, was believed to be that of the Philadelphia Gas Works, at Point Breeze station, in the suburbs of Philadelphia. It is a telescope with two lifts, having a diameter of 160 feet and height of 95 feet, or nearly the height of the three-lift holder of the City of London Gas-works, the highest in London. The diameter of the tank is always some two feet greater than that of the holder, and the height given is exclusive of the columns that support it, which are a little higher still. Its entire capacity is or was intended to be 2,000,000 cubic feet, but it has proved a failure as a large holder. as the strength of the cup is not sufficient to stand the pressure of 2,000,000 cubic feet of gas, and only one lift is used—the top lift not working—consequently it is, to all intents and purposes, but a single-lift holder, with a capacity of less than 1,000,000 cubic feet. The Point Breeze tank is an expensive structure—the tank being laid in stone-work carried up to inclose the holder, massive buttresses being erected on the outside.

In 1865, the collective capacity of gas-holders in London was about 35,000,000 cubic feet, equal to the contents of a single holder 800 feet diameter and 70 feet high, or to sixteen holders, 200 feet diameter and 70 feet high, or to 64 holders, 100 feet diameter and 70 feet high. There were then thirteen companies in London employing £5,602,900 capital. The share capital drawing dividends was £4,455,581; total profits for the year exclusive of interest paid, £410,-697; gas rentals, £1,411,788; sale of residual products, £341,061; cost of coal for the year, £728,551; cost of manufacture and management, £573,000. The price per ton of coal for making gas, in 1865, in London, varied from 17s. 3d. to 24s.; the number of tons carbonized was 882,770, and the product of gas at 9,200 cubic feet per ton of coal, was 8,121,484,000 cubic feet. The Imperial Gas-Light Company of London then took, as it now takes, the lead in large gas-holders. In 1857 this company built their great holder at Hackney Road station, which is 201 feet diameter of the lower lift, and 198 feet 6 inches in diameter of the upper lift. It goes out 80 feet, and holds about 2,500,000 cubic feet of gas. The same company also had then a double-lift or telescopic holder, previously built, 200 feet in diameter and 64 feet high, and among their smaller holders was one 160 feet in diameter. Since then they have constructed one 230 feet in diameter—the largest in the world—having a capacity of 3,000,000 cubic feet The third holder in size, in London, belongs to the Phenix Company. Its dimensions are 160 feet diameter, 70 feet high, and capacity 1,385,000 cubic feet. It was built in 1855. The city gas works of London has one of three lifts, each 32 feet 6 inches high, or 97 feet 6 inches in all, the bottom lift being 82 feet in diameter, and the height of columns 105 feet; total capacity, 450,000 cubic feet. Liverpool comes next to London, the largest holder of the Liverpool gas works being nearly equal in capacity, if not quite equal, to that of the Imperial Company. The original design was that it should be 240 feet in diameter, 70 feet high, with a capacity of 3,100,000 cubic feet, which would have placed it at the very head of the list.

Dublin also looks up in this respect. The Consolidated Alliance and Dublin Consumers' Gas-Light Co. has in the course of construction a holder 184 feet diameter, 56 feet high, with a capacity of 1,400,000 cubic feet, being a three-lift holder. It will cost—that is, the holder alone, independently of the tank and piping, £18,800. The same works have also two others in use, respectively 120 and 130 feet in diameter and 50 feet high, the capacity of both together being 1,500,000 cubic feet.

Coming back to our own country, we find that New York now takes the lead in large gas-holders, measuring by capacity in practical use. The largest holder thus estimated on this Continent belongs to the New York Gas-Light Company, and is situated on the block bounded by Avenue A and First avenue, and Twentieth and Twenty-first streets. Its dimensions are as follows: Diameter of tank clear of the brick-work, 171 feet; diameter of holder, 168 feet; height of holder above the level of the curbing, 70 feet. It is supported by sixteen wrought-iron columns, 72 feet high, 3 feet in diameter at the base. The capacity of the holder is 1,500,000 cubic feet. Had the Point Breeze holder at Philadelphia proved a success it would exceed this by about 500,000 cubic feet, but for all practical purposes the New York tank is greatly its superior. It is hardly correct to speak of its being supported by sixteen columns; they simply form what is called the guide frame. This holder, unlike most others, has no counter-weights, but works on the principle of pressure alone, that is to say, the sections (being telescopic) are lifted up by the pressure of the gas within, and this pressure may be regulated according to the requirements. It is made of iron plates three-eighths of an inch thick, closely riveted together. It was twenty-three months in being constructed, and has been in operation about two years. It holds gas sufficient to supply the entire district of the company, at the present season of the year, sixteen hours. The cost of the iron holder, independent of the tank, was $158,000, and the tank alone, being built in quicksands, cost about $200,000. Where this holder now stands, twenty-four years ago, was a fishing ground for eels and clams, and at the corner of Twenty-first street and First avenue a sloop was moored. Since then the city has gradually encroached upon East River, through the agency of the dumping-cart, until now the old eel and clam fishery is away inland, and densely populated blocks and smoking furnaces, and the hum of business and labor, almost obliterate the very recollection of those primeval things.

Outrageous cynics have called Brooklyn a "suburb of Greenwood Cemetery," "Little Peddlington," and the like, but Brooklyn has some very respectable gas-holders, without any reference to her politicians. Her largest is 110 feet in diameter, and the Nassau Company has one in the course of construction 101½ feet in diameter.

The amount of gas consumed annually in the city of New York, is not far from 3,000,000,000 cubic feet. The number of tons of coal annually carbonized, is something over 300,000; the amount of gas product per ton of coal, exclusive of the loss by leakage and condensation, which is about 10 or 12 per cent., is stated at about 9,000 cubic feet. American coal is chiefly used now, and it is said to be superior to the best English coal for producing illuminating gases, both in respect of quantity and quality. The net estimate of gas per ton of coal in England, is 9,200 feet, but their waste account is, owing to local causes, insignificant compared to ours.

The subject of gas, however, though germane to that of gas-holders, is outside of the scope of this article, and will be pursued no further in this connection.

THE BROOKLYN *Eagle* asserts that the gas is so bad in Montreal, that in some parts of the city they don't think it worth while to light it at all.

[From the *Daily Avalanche*, April 7.]

New Gas Works at Memphis.

COMPLETION OF THE MEMPHIS GAYOSO GAS WORKS CELEBRATED BY A BANQUET AT THE PEABODY—THE HOTEL LIGHTED WITH GAYOSO GAS—RISE AND PROGRESS OF THE NEW COMPANY—ITS TROUBLES AND TRIUMPHS—A SKETCH OF THE WORKS.

Last evening the President, Board of Directors, stockholders and employes of the Gayoso Gas Company, together with a few invited guests, met in the Peabody Hotel to celebrate the lighting of that establishment by the new gas. In front of the hotel was an arch of gas jets, while the entire house was made bright by the new illuminator.

The meeting was addressed by Col. Donovan, President of the company; R. T. Coverdale, Chas. Collier, President of the Selma (Ala.) Gas Co., and Judge Mulroy.

THE WORKS AND THE CONTRACTOR.

The accomplishment of the great work, so happily reflected in the flames of the jets over the festive board last night, is in no small measure due to the energy and enterprise of the contractor, Mr. R. T. Coverdale, of Cincinnati, who has stood to the company through all its embarassments and vicissitudes. The contract for the building of the works was made with that gentleman on the 7th of August, 1867. He began with the laying of the street mains. When between four and five miles had been put in the ground, which was early as October, 1867, the work was stopped by an injunction obtained by the Memphis Gaslight Company on the plea of an exclusive privilege. At this time the Gayoso Company had exhausted all its resources, and with the injunction referred to its hands were completely tied. After years of litigation, which employed the best talent of our city,

THE INJUNCTION WAS FINALLY DISSOLVED

and in November, 1871, arrangements were again made with Mr. Coverdale for the prosecution of the work. He began with a will, as in the outset, building tanks and laying mains. The winter was a remarkably severe one, navigation being closed early in December, and so remaining until late in February, with an interruption during January that enabled the Company to receive the first shipment of machinery on the 13th of that month. From this time the work was prosecuted with increased vigor, and on the first day of the present month the work of gas making was begun. The first light was struck that day, Mrs. Rounds, wife of the Superintendent, applying the match, and thus Mr. Donovan's promise to the stockholders of the company and the public was made good, That promise was that the Gayoso Company would supply light on the first of April, 1872. Thus in less than five months Mr. Coverdale, under the most embarassing difficulties, had accomplished his part of the programme.

THE FIRST ACTUAL CONSUMER.

was Mr. Quackenboss, whose residence is at the corner of Ohio and Walker streets. The new gas was turned on at his residence on the night of the fourth instant, and last night the Peabody Hotel was for the first time a consumer. It was illuminated within and without, and the brilliancy of the light attracted much attention. The reason for not lighting up generally through the city since the first instant is that the mains originally laid were found to contain water pumped in by Mr. Duffin during the litigation. This difficulty will be overcome within the coming week, and then all Memphis will shine in its redemption from unscrupulous monopoly.

Mr. Coverdale is an engineer and contractor, and in the course of his experience has constructed works for some twenty gas companies. He asserts that the works for the Gayoso Gas Company are the best he ever constructed, and under their jets of flame at the festive board of the Peabody he felt, with Mr. Donovan, the President of the Gayoso Gas Company, that last night was the proudest of his life. The works have

ALL THE LATEST IMPROVEMENTS

connected with gas making, and are constructed upon the most substantial and economic plan.

The machinery of the works consists in part of a gas-holder 20 feet in depth and 100 feet in diameter, with 12 cast iron columns and lattice girders. The retort house, which is of brick, with iron truss roof consists of eight benches of retorts, five in each. Th

machinery of the purifying house consists of four purifiers of the dimensions of 10 × 14 feet, with four tiers of lime trays in each. The connections throughout are ten inches in diameter, with a dry center seal valve of the same dimension. The condensing house has one boulder washer and three annular condensing tubes. The exhausting room has one exhauster of a capacity of 15,000 feet per hour, with bye-pass valves, compensator and vacuum, together with pressure registers and steam boiler and engine, connected with which is a patent governor, regulating the speed of the engine.

IN THE OFFICE.

is a station meter of 600,000 feet capacity, with bye-pass and valves complete; also governor and pressure and water guages.

The company has now ten miles of street mains laid ranging from twelve to four inches in diameter.

Contracts have been entered into with 1,200 consumers for a period of two years at $3 per thousand feet, which is

FULLY TWO THIRDS

of the entire consumption of the city. Service-pipes have been already introduced for the accomodation of 600 consumers, all of them, with stop-cocks and stop-boxes, and up to yesterday. Some fifty or sixty consumers rejoiced in the new light last night.

THE SUPPLIES.

The main pipes for the new company were furnished by the Gaylord Iron and Pipe Company, of Cincinnati, and are of the Robbins' patent joint pattern. The same company furnished the benches and the special street castings. The gas-holder, purifiers, iron roof, center seal valve, etc., are the work of Geo. Stacey & Co., of Cincinnati. McIlvain & Speigle, of Cincinnati, supplied the boiler and attachments. The exhauster, compensator and governor came from the Smith & Sayre Manufacturing Company of New York. The valves, bye-pass and connections were furnished by Dræge & Co., of Covington; Harris, Griffin & Co., of Philadelphia, supplied the meters. The retorts and tiles are from the works of James Holmes of Covington, and the lime trays are furnished by James Martin of the same place.

THE CONTRACTOR,

Mr. Coverdale, is apparently about 40 years of age, an engineer and contractor by profession, and a representative man of his profession. His appearance is as suggestive of modesty as of enterprise and energy. Among the gas works built by Mr. Coverdale are those of Troy, Gallopolis, Ironton, Saginaw, Topeka, Urbana, Circleville, Lancaster, and Piqua. Happy that the Gayoso Gas Company, after all its litigation and vicissitudes, is an "accomplished fact," he will leave for new fields of labor in the course of a few days.

The cost of the Gayoso Gas Company's works is $250,000.

The Buffalo Mutual Gas Company.

[From the Buffalo Commercial Advertiser, April 17.]

We take it for granted that all our readers know that an organization called the "Buffalo Mutual Gas Company," has existed in the city for a year or two; also that the officers of the company are well-known citizens, distinguished for business ability and enterprise; also that the avowed object of the company is to supply the city with good gas at fair rates, and by an honorable competition break the monopoly that has thriven so long and so well in Buffalo, and "whose right there was none to dispute" heretofore, in the matter of furnishing light and charging exorbitant rates for that most essential article. Of all this our readers are aware, but, perhaps, comparatively few know that the buildings of the new company are all completed; such is the fact, nevertheless.

The works are situated on Elk street, near the L. S. and M. S. R. R. crossing, and have been excellently constructed in every way. The benches have all been built and the retorts are nearly all set, The purifyers are now being put together by H. G. Morris, of Philadelphia. The retort house is 112 by 60 feet: the purifying house 130 by 40 feet, and the engine house 40 by 40 feet, with boiler attached. The engine house is the gem of the works, and is justly admired by all who have seen it. The room on the first floor is finished in black walnut and cherry, and the exhauster, engine governor, and station meter, are all in this room. Everything connected with the engine house is under the control of the superintendent of the works.

The holder is now being erected by Jesse W. Starr & Sons, of Camden, N. J., under the direction of Mr. Harrison McKinstry, of Boston.

The tank is 90 feet in diameter and 20 feet deep, and was completed last fall, and although it has been exposed to the severe weather of the past winter, has not been injured in the least. The perfection of this fine piece of hydraulic work is due to the company's engineer, Mr. Robert Cartwright.

All the machinery and other material is on the ground, and everything is of the newest construction and evinces the highest quality of workmanship. The buildings present a fine architectural appearance, and have been erected with a view of utilizing all practical advantages. A large number of men are constantly employed, and the work is being pushed with the utmost dispatch. It is expected that the whole affair will be completed by June next. Messrs. Libby & Clark of New York city are the contractors, and Mr. Clark has given the entire work his personal supervision. The firm are certainly entitled to much credit for the way in which these fine structures have been erected.

We are informed that the pipes of this company are all ready and will be laid as soon as the weather will permit. The severity of the past winter has of course retarded the whole work somewhat.

We have thus endeavored briefly to give a description of the buildings, and we advise those who may be interested, to make the trip out to the works and give them a personal inspection. All such will be amply repaid, and will have the opportunity of examining many things connected with the enterprise that have not been mentioned in this article.

Gas Extensions.

EXTENSION OF GAS MAINS—THE OLD COMPANY WAKING UP.

[From the Louisville *Courier-Journal*, April 21.]

Some idea may be formed of the steady and increased growth of our city, from the yearly increased demand upon our gas and water companies for their several specialties. The gas company is from year to year compelled to distribute their street mains in every direction, and the great demand on the present large main-pipes, or arteries, necessitates the laying of an additional principal line, and the continuation of those already laid. The gas company have had in contemplation for several months past, the construction and laying of a much larger-sized pipe than any before used by them. The pipe is now being made. It is eighteen inches in diameter, and will run from the works on Washington street to Preston, out Preston to Green, and down Green street past the office of the company—in all, a distance of one and a half miles of this sized pipe alone. There will also be laid, commencing next month, a large amount of 14-inch and larger sized mains.

These pipes or mains are for carrying out the great gas artery of Louisville, looking towards the extensions over the western and southwestern limits of the the city, and stretching towards California and Oakland. At the last named place there will be erected, in the course of a few years, a large "holder," thus having a triangular system of gas-holders, three or four miles apart, with the thickly-populated part of the city in the center.

The company has been at work during the past two months on the grounds of their works making the tank, or reservoir, for the reception of a large "gas-holder," to be completed this summer. This holder will be one of the largest used by them, and is as large as any piece of work of the kind west of the Alleghenies. Its dimensions are 111 feet 6 inches in diameter, with a double, or telescopic lift, or section, each lift being 24 feet high; making its total height, when full, 48 feet. It will be supported by ten large cast-iron columns, each 53 feet in height. This holder will be extensive in every respect, and a splendid piece of workmanship. Its capacity will be 510,000 cubic feet. It is expected that the bricklayers will commence work on the tank by the 1st of May.

The contracts for all the work above mentioned are for the street mains of all sizes, Dennis Long, of the Union Pipe Works of our city; for the 2,000,000 of hard brick for tank, J. P. McCullum, of this city; for the gas-holder complete in all parts, Dennis Long. In addition to these there will be valves, house-work, castings, etc., not yet contracted for.

The cost to the gas company for these additions and extensions will be over $140,000, and when completed they will be sufficient to store gas and meet the demands on the company for fully one-third more consumers than are now supplied, and certainly more than they will ever have use for, unless they materially reduce the price of gas.

One noticeable feature of this important work is that our city manufacturers are fully able to do it all, and have been awarded the contracts for same, thus retaining in our midst all the money to be expended; whilst Cincinnati, Chicago, St. Louis and other western cities have had the material and work for their gas extensions made in the east.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—ED.

Correspondence from Ireland.

CIVIL ENGINEERING AND GENERAL SURVEY
OFFICE, 65 SOUTH MALL.
CORK, April 4, 1872.

Mr. Editor: In your Journal of March 16, 1872, under head of "Chemical Excerpts," the following appears: "190. *Sensitive Flames.*—Professor Govi, of Turin, augments the sensitiveness of Barret's singing flames, by placing above the gas jet a piece of wire gauze."

The merit, if any, of the discovery of this new form of sensitive flame, I think is due to me. Nearly twelve months ago I observed that by placing a piece of wire gauze (32 meshes to the lineal inch) about two inches above the burner, and lighting the gas *on* the gauze, not at the burner, a flame was produced of extraordinary sensitiveness: The burner used was a pin hole jet. I sent an account of it in October last to Prof. Tyndall, London. A full description of the flame, with diagram, appeared in *Nature*, of 9th November, 1871, and was afterwards mentioned in the *Times*, *English Mechanic*, and other papers, in all of which my name was associated with it.

I am, Mr. Editor, your obedient servant,
PHILIP BARRY, C. E.,
Gas Examiner, Cork Gas Consumers' Co.

The Price of Gas Furnished by the Metropolitan Gas-Light Co. of Brooklyn.

METROPOLITAN GAS-LIGHT CO. OF BROOKLYN,
OFFICE, No. 563 ATLANTIC STREET.
BROOKLYN, N. Y. April 18, 1872.

Mr. Editor: In your issue of the 16th inst. under the head of "False Witness," and in that part of the article referring to "Ring-ridden Brooklyn," you say, "The other Brooklyn companies, we are told, with the single exception of the Peoples, find it necessary to charge still more" (meaning more than $3.25 to private consumers, and $2.75 per 1000 cubic feet to the city,

Be kind enough to correct this statement, so far as applies to us, our price always having been $3.25 to the private consumers, and $2.75 per 1000 cubic feet to the city. When the Internal Revenue tax of 25 cents per 1000 cubic feet is remitted, our consumers, both private and public, will have the benefit of it in a corresponding reduction of price.

Very respectfully yours,
C. H. STODDARD,
Secretary and Treasurer.

[In giving place to the above, we regret that lack of time to make thorough inquiry, led us into the erroneous statements referred to; and hope, if we make, or have made, any others, similar or otherwise, that

they may be corrected in the same way, and meet with the same courteous indulgence as manifested here by Mr. Stoddard.—Ed]

Philadelphia Gas.

Memphis, Tenn., April 20, 1872.

Mr. Editor: In your issue of the 16th inst. you refer to the management of the Philadelphia gas works, and from the general drift of your remarks I am left to suppose that you have not seen the Thirty-seventh Official Report of the Trustees, issued January, 1872. I have a copy before me, and make the following extracts, which I trust may prove of interest.

On page 9, we are informed as to the average candle-power of the gas furnished that city, to wit, 14.95 candles, "which," the report says, "is 2.95 candles higher than the standard fixed by law." Tests made by Charles M. Cresson, M. D., five times during each month.

The city is lighted by 8,656 gas lamps, for which was paid $583,812.70 during the year, or $67.44 per lamp! The coal used during 1871 amounted to 157,453 tons, from which 1,338,972,000 cubic feet of gas was made, showing the average yield for the year to have been about 3.8 cubic feet to the pound of coal—very indifferent coal I should say. Private consumers took 937,177,700 cubic feet of gas, for which was paid $2,372,238.13, or a fraction over $2.53 per thousand cubic feet. The 8,656 public lamps consumed 229,120,197 cubic feet, or 26,585 cubic feet per lamp—pretty steep. There was used at works and offices, and lost by leakage and condensation, 157,613,349 cubic feet, or about 11.8 per cent of the whole make. Very small—accounted for by the extravagant street lamps. I have studied this report pretty carefully, and have this to say; I would like very much to take the Philadelphia Gas Works and pay off all the debts, furnish 16-candle gas at $2.50 per thousand, and light the city free. I will give ample security for the faithful performance of the contract. Yours,

George W. Gift.

Paint for Inside of Purifier Covers.

Clinton Gas and Coke Company,
Clinton, Iowa, March 31, 1872.

Mr. Editor: Please oblige by informing me through the Journal, what would be the best paint for inside of purifier covers. Several paints I have tried soften and slide off. Yours respectfully,

S. Goozee.

[We were not aware that it could be, in any ordinary case, necessary, or even desirable, to paint the *insides* of purifier covers, no more than, for example, the inside of a holder. The tar that condenses, or even the gas itself, forms a protective, than which none better. However, as our correspondent may have some *extraordinary* case on hand, we would suggest a paint with a basis of shellac dissolved in borax or in ammonia, to which body may be given, if desired, with pipe-clay or any kind of ochre. A pure linseed-oil paint, after thorough drying, resists tar very well. We should like to hear suggestions, if there are any new ones, of a practical sort, on this head.—Ed.]

The Petroleum Monopoly.

BEFORE CONGRESS.

At the hearing before the Subcommittee on Commerce, in Washington, April 17. in relation to the South Improvement Company, Peter H. Watson, Ex-Assistant Secretary of War, produced copies of contemplated contracts between that company and several of the railroad companies, by which the rates of freight, drawbacks and rebates were provided. Also, the draft of a contract between the South Improvement Company and the producers of oil. He testified also that the arrangements between the producers, the refiners, and the railroads were made for the mutual protection and benefit of all these parties, so that the trade would be steady and remunerative; that before the plan was consummated, although he invited the producers to become parties to these arrangements, and although the producers of more than half of all the oil had expressed the opinion that this arrangement would be highly advantageous to them, yet, before those producers had actually entered into any contract, an intense excitement grew up, owing to false rumors and misunderstanding, and the producers treated the overtures of the Southern Improvement Company with scorn; therefore the whole plan had been given up, the contracts had been cancelled, and everything left as it was.—*N. Y. Times.*

Notes on Fire-Proof Buildings.

A paper read by Professor Lewis before the General Conference of Architects, 1871.

The subject of fire-proof flooring can scarcely be treated under one head. For a floor might be practically fire-proof in a position where the heat is not likely to be great, whereas it would be useless otherwise. In the ordinary range of dwelling houses there is nothing to burn but the furniture and the timbers of the floors and partitions, mostly protected in part by plastering, and the heat given out is seldom enough to consume entirely even them. But in a warehouse stored with goods, which add to the mass to be consumed, the power of fire is shown in its most terrible form, and strong iron doors are crumpled up like paper. In a private house also, not only is there the advantage of there being less heat, but the floor-timbers usually bear at each end on a wall or partition. And even if the latter be of wood, it can easily be made almost fire-proof, either by filling in between the timbers, after the French manner, or with brick nogging and good plastering. But both must be carried up the whole extent of the partition, without vacancies between the floors.

By the modern plan of keeping the wall-plates out of the wall, the solid bearing is lost, and the wall-plate itself more exposed. The custom of carrying this plate upon stone or iron corbels is a bad one as respects fire; for, though neither iron nor stone will burn, they will be shivered to pieces under the action of fire. A safe bearing can easily be obtained by forming oversailing courses of brickwork. No fire that I have ever known will destroy that.

In an ordinary dwelling-house, with plastered walls and no unusual amount of furniture, I look upon the plan of using wrought iron joists filled in with pugging, as being a good protection, provided always that the under sides of the joists are well protected by plaster. I consider, however, that a very thick layer of ordinary pugging, filled in between wooden joists, would form as good a defence against fire, provided that the pugging could be combined in some way with the plastering of the ceiling, so as to form the two into one mass. The difficulty as to this, and it is one which I have not been able to get over, is that the fillets on which the pugging rests must be tolerably wide, and be kept some distance up the joists in order to prevent the latter splitting with the nails used for the fillets. Thus there is a space left between the sound boarding and ceiling too great to be filled in by the key of the plastering. This can be got over with iron joists, as the sound boarding can lay on their lower flanges. In case these joists are not used, I think that the best plan is to use pugging, say 3 in. thick; to have the sound boarding in very narrow widths placed half an inch apart so as to let the pugging pass through the interstices, and then to render the under side of the sound boarding whilst the pugging is wet. But the boarding, of course, must be thoroughly dried, or as bad an enemy may be admitted almost as fire—namely, dry rot.

Before leaving the subject of dwelling-house floors, I must, however, call to your mind that the slight joists now used present very much greater facilities for destruction by fire than did the old heavy timbers formerly used. As architect to one of the chief insurance offices, and also to the London Fire Brigade, I have seen several thousand cases of fire, and it has been very rare, indeed, in the case of a dwelling-house, that a solid piece of timber has been burnt in more than an inch or so. A girder would be safe. But such an injury to one of our light joists would be fatal.

A few words may, perhaps, be devoted to staircases, though I am not sure that they come quite within the scope of my subject. But they are incalculably the most important part of the house as respects the means of escape, whilst they are, unfortunately, just the very part up which the flames rush with the greatest violence. In several damaged houses that I have seen, many of the rooms were scarcely burnt at all (the doors having been closed), whilst the staircase was utterly destroyed. It happens too, unfortunately, that this part of the building is, in our modern system of construction, the least protected. The wooden stair-case is made with a thin-cut string, allowing full play for the flames against the end of the treads. The fire thus gets easily between the tread and the plaster soffit, and the utter destruction of the stair-case is effected in a few minutes. Doubtless stone stair-cases are better than wooden ones; but I have seen even them repeatedly destroyed by being split by the heat and water, as in the case of a large house at the West end, in which three people were suffocated. The stairs were of stone, and, very curiously, the landings were formed of ordinary wooden joists, with a thick ceiling of plaster. Every step, although of good solid Portland stone, was broken to bits. The wooden landings were absolutely uninjured. For safety, we must go back again to the old plan (for we are not quite so much wiser than our fathers as some think) and use thick close strings (protecting the sides of the treads), whilst the space between the latter and the soffit is filled with plaster.

The real difficulties of fire-proof construction begin where there is a large mass of combustible materials as in warehouses and similar structures. In these, the heat developed is something which an ordinary observer would scarcely credit. I exhibit some specimens of brass and iron nearly in a melted state, showing that the temperature which they had failed to withstand must have been some 2,000 degrees Fahrenheit. The whole place, in fact, must have been a glowing furnace. Now, to resist this heat, the use of timber is generally scouted as absurd, and reliance placed upon iron. This material no doubt will not burn; but from the specimens shown, you see that it will melt. Long before its melting point, the heated iron must have softened and lost its strength; and long before it began to soften it would snap asunder when chilled by the water dashed against it by the firemen. It is the latter risk that makes the iron construction so dangerous, and the boldest man in the brigade would hesitate to enter a building on fire whose supports he knew to be of iron. This risk is mainly owing to the exposure of the iron to the direct action of the flames, and it is curious that, almost without exception, what is called "fire proof flooring" allows of this action. If that be the case, I know of nothing whatever that can save the floor.

In one of the warehouses burnt in the great fire in Tooley street, a different plan of iron fire-proofing had been tried on nearly every story. But each left the under side of the iron exposed. The result was a scene of utter destruction very difficult to realize. For the wreck is much greater where iron is used than where timber is employed. The iron expands and strains the walls; whilst wooden girders would leave them intact. I remember one striking instance of a factory which was very strongly built on a circular plan, the iron floor girders radiating from a large well-hole in the centre. These girders of course expanded when the place was well on fire, twisted and broke the iron curb, and then pushed the walls bodily out. There must always be a likely chance of this occurring if any part of the iron be exposed. In such a case, and I say it distinctly, it will be safer to use thick wooden girders and brick arches than to turn these arches upon iron. It is not often that one has the opportunity of comparing the two materials, but I was enabled to do so in a large warehouse on Tower-hill. All the iron girders, though of sufficient strength, except in the case of fire, snapped in half. The wooden girder was burnt in for about an inch, but was otherwise intact.

It is difficult so to cover iron as to protect it, and many schemes have been devised for protecting it otherwise. The favorite one, no doubt, is to make the girders and columns hollow and fill them with water. This looks well in theory. But the ironwork must be *always* kept filled or it never will be so, when wanted; and there is then a very unpleasant risk of leakage. But setting that aside, if the hollow work be open to the air, the water will soon be blown off into steam by the terrific heat generally attained; and, if closed, the whole of the ironwork will soon assume the conditions of a steam boiler with its safety valves screwed down. I scarcely need quote examples to prove this. I have one, however, ready. At a large coal store on the Regent's Canal basin, the pipes of the hydraulic apparatus were full and closed. The cast-iron head, 1¼ in. thick, was split open from end to end and the pipe torn bodily out of it. All other attempts to protect iron efficiently have failed, as far as I know.

[*For continuation see page* 144.]

THE AMERICAN

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THURSDAY, MAY 2, 1872.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

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GAS-PURIFICATION—A NEW "REFEREES REPORT."

It is now, some two weeks since, by favor of the Gas Referees of the British Metropolis, we received this document; relating chiefly to the sulphur-purification at the new and immense suburban works at Beckton, of the "Chartered Co.," or "Gas-Light and Coke Co." These works, if not already so, are destined soon to be, the largest in the world; as we learn that this Co. has determined, with a view to closing ultimately all their urban stations, and transferring their whole make to the Beckton, to enlarge the latter at once to a capacity of *twenty million feet per day!* During the last half of 1871, the consumption of coal by this one Co., at its six gas works, was 200,200 tons, and the whole make of gas last year about 4,000,000 thousands, or more than the total make in New York, with all its neighboring towns; although but three years since, in 1868, it was but 3,000,000 thousands. Even at this rate of increase, they would need a total capacity of twenty millions per day in a very few years, but then it is well known that increase of gas-consumpt, as a rule, follows *geometrical* ratios, and runs up like compound interest. The "Governor" of this Co. remarked, at their semi-annual meeting, April 5th.: "The facts are astonishing; the people seem to take all we can give, and still ask for more gas."

But to return to our topic:—as we cannot, without crowding out, begin to present this Referees' Report until our next, it will be well, in the interim, to glance at some of its main points and conclusions.

It is to be premised that this new document of the Referees, equally valuable, or rather invaluable, with those we have had before; relates to the highly important questions connected with the purification of the gas, from that portion of sulphur which does not tinge the test-paper; and which has been usually supposed to be chiefly, if not wholly *bisulphide of carbon*. There is no good reason, however, why we should not find also the well recognized compounds CS and CSO, as before suggested by the present writer, in a Report on Purification Methods, made in 1868, to the Manhattan Gas-Light Co. (copied at the time into the London *Journal of Gas-Lighting.*)

The new Beckton Works, arranged for the use of lime and iron purification conjointly, furnished opportunity for such investigations. In proportion to the make, the purifying area at Beckton is larger than any other of the London Works; double that of some. It was therefore anticipated very reasonably that the acme of purification, so far, would be attained. Nevertheless; a complete disappointment followed, the gas, notwithstanding every effort, being *more impure* than any other gas supplied to the Metropolis. The iron was first put before the lime; and this plan failing, the lime was put before the iron. In June and July 1871 (during the minimum make) the sulphur in the purified gas from the Bow Common Works (same company, same lime, and *ceteris paribus* altogether) where the purifying surface to that at Beckton is but as 18. to 22, was but 18.4 grains per 100 feet, while at Beckton it was no less than 43.2 grains! After much study and investigation, the Referees appear to have come to the conclusion that this was due primarily to defects in the previous treatment, the scrubbing and condensation. Observations on the temperature of the scrubbing water showed at Becktonan average of 100 degs. F., while at other works it was not higher than 70 degs. They infer hence that more *carbonic acid* passed on to the purifiers, to such an extent as to convert a large proportion of the lime into inert carbonate.

It appears that the Referees have adopted the view presented by the present writer in his Manhattan Report above referred to, that bisulphide of carbon is separated from gas in a lime-purifier as a red *sulphur-salt* with sulphide of calcium.*

The view of the Referees appears to be that when carbonic predominates over hydrosulphuric acid, no sulphide of calcium, hence no sulphocarbonate can be found, but only carbonate. This is clear, and chemically reasonable enough. In applying aur own peculiar views, a little modification is necessary. We have long maintained that the gas as it reaches the purifiers can contain *no free* hydrosulphuric acid, but only sulphide of ammonium.† It follows, in all probability, that the bisulphide of carbon in crude gas is present as a *volatile* sulphur-salt, or *sulphocarbonate of ammonium-sulphide*, which has to be broken up by the lime. It is easy to understand how the presence of an excess of carbonic acid may prevent such breaking up.

There is one criticism we are forced to throw out. The Referees, after showing, by the smaller average yield, that the average *heats* maintained at Beckton must be lower than at Bow Common, state nevertheless that, by reason of peculiar settings (of *nines*) at Beckton, the lower middle retort is overheated; and they opine that consequently more bisulphide of carbon may be formed at the start at Beckton (from these overheated retorts) than at Bow. From this we must conclude that the Referees are not thoroughly posted in recent chemical literature bearing on this subject. Berthelot has shown that bisulphide of carbon is *dissociated* into its elements quite powerfully, at a bright red heat. Sidot has since shown (*Comptes Rendus*, vol. 69, p. 1303) that more bisulphide is formed at a *dull* red than at a *bright* red; that at a *high* red heat, approaching whiteness, none is formed at all; and that moderate redness is the most favorable condition for its manufacture. Our own deductions from the facts the Referees present would rather be that probably, *in consequence of the low heats* at Beckton, much bisulphide is there made, and none at all at Bow. Would not *this* (together with the other reasons they have propounded) make the failure in purification at these splendid new works tolerably comprehensible?

FIRE-PROOF BUILDINGS.

In a previous editorial, the remark has been used that notwithstang the plans the Editor has worked out for the chemical preparation of wood, so as to make it resist fire, while possessing other new and valuable qualities, appear to fall on dead ears, we still feel impelled by duty and humanity to harp thereon. An occasion is furnished us by an article on another page, emanat-

* In claiming this theory as original with myself, I wish to say that I do so because I have never met with the suggestion elsewhere, antecedent to the Report referred to. If it can be found, however, at an earlier date, in the literature of gas, I must, and cheerfully will, resign such claim. The passage in the Report of 1868 reads as follows:

"We have shown above that the hydrosulphuric acid of the gas passes in the purifier into the form of *sulphide of calcium* (CaS), which, as shown long ago by Berzelius (Gmelin; ed. of 1843, vol. 2, p. 200). combines with sulphocarbonic acid to a sulphur-salt of considerable stabilty."—H. Wurtz

† See Testimony in the case of the Metropolitan Gas Light Co. *versus* the Metropolitan Board of Health of New York; this Journal for March 16, 1869, page 274 and sequel; also this Journal for Feb. 2, 1872, page 40.

ing from an expert skilled not only in architecture, but in insurance matters, which confirms distinctly most of the views we have enunciated. According to Professor Lewis's wide and varied experience and observation, timber, *if heavy enough*, far surpasses either stone or iron, in its resistance to intense fires. No buildings present such grave examples of utter dilapidation and devastation, after a fire, as those having iron for their main constituent. He concedes too much, however to iron, when he says that the iron will not actually *burn*. The Chicago fire told a different story. Immense masses of iron *did* actually burn there, and slag down on a great scale. The destruction, he attributes to the expansion, warping, twisting, and cracking of the iron. The plan advocated by Powers, the sculptor, of coating wood with sheet iron, he states to have been found useless, except in some special cases of factories, where much oil is used.

Now we wish to ask, if, as stated by Mr. Lewis, heavy solid timbers usually resist a fierce fire, without damage to a greater depth than "an inch or so," whether it is not reasonable to maintain, as the Editor does, that the light timbers used in modern buildings would resist altogether, if rendered incapable of kindling at all, by impregnation throughout with permanently liquid substances?

Our own experiments have made it so palpable to us that this is the only direction in which we can hope, without material increase of expense, to attain to dwellings which will be at least *practically* fire-proof, that we do not understand the indifference with which these ideas are met, unless in the case of those interested in Fire Insurance, who of course don't want any cheap plan for fire-proof dwellings. The very remarkable new qualities given to the wood, besides uninflammability, namely imperishability, infrangibility, non-conductibility, incontractibility by seasoning, and so on, make this indifference the more inexcusable.

THE JOURNAL OF APPLIED CHEMISTRY ON GAS LEGISLATION.

We could scarce believe our eyes, when we read in the pages of our usually intelligent contemporary, named above, for April, a highly approving notice of the bill of Mr. Moulton, now before the Legislature, and which was discussed by us a month since. Our neighbor says :

We wish it were possible to execute a law so stringent as the one given below, but fear that it is entirely out of the question."

Well may he say the latter. When, however, he says :

"We strongly suspect the monopolists chiefly interested were at the bottom of the whole thing."

We must be allowed to demur to any such conjecture. The whole affair is nothing but the offspring of a union of malice, with ignorance tantamount to idiocy.

Indeed, we cannot think that our *confrere* has *read* the bill, as a chemist ; or has noticed that it imposes the separation from coal gas of its carbonic oxide, that it requires a degree of purification from sulphur as yet unknown and even scarce hoped-for by the gas chemist, that it provides no means whatever by which the consumer may determine, except at his own expense, whether he is being fairly served, and many other absurdities, the whole forming a farrago which appears to us calculated to excite no other emotion than contemptuous ridicule, and to suggest strongly the aphorism "*ne sutor ultra crepidam.*"

THE ROOT EXHAUSTER.

We have before referred, in these columns, to the well-known "Root-Blower." The apparatus we illustrate this time on our first page, is an exhauster constructed on the same principle. As stated there, we find that this Exhauster is in use by the Manhattan Company, of this city, among others. Our inquiries at the office of the company named, have convinced us that the claims set forth as to the peculiar advantages possessed by this plan of construction are fully confirmed in practice. We are assured that the Root Exhauster has given, in its working, eminent satisfaction in every respect. It is clear, from the principle of construction, that the friction must be reduced to a minimum, and that no amount of condensation that is ever likely to take place in the interior could clog or obstruct the gas in any way. Thus not only is motive power economized but wear and tear, and time and trouble in opening for cleaning, repairing, etc., etc.

We are told that these machines have been ordered at the San Francisco Works, and also at the Cincinnati Works.

PATENT

OAK AND RATTAN GAS SCREEN.

It is five years since these Screens, made of Oak and Rattan, for purifying coal gas, were first introduced, and a thorough trial of them made. Up to this time they are used in many of the largest gas works in this country, with the highest approval over all other Screens.

They are so simple in construction and the material used so adapted to the use they are put too, that it is certain no other way of making a gas screen can ever compete with this. Oak is used for the frames, and put together by a round tenant and mortise, using steam-bent oak for fitting around pipes; after which, rattan is interlaced when wet, thus holding the frame firmly together, and *dispensing with all pins or nails*, which are liable to drop or rust out, and in this manner we produce a *light, strong* and *durable* screen with uniform perforations, that will always remain in place, which is not the case with slat trays. They also give a purifying surface of over *one hundred per cent. more* than any other screen, greatly lessening the pressure on the retorts.

A. M. GILES, of the Boston Gas Works says under date 26th January, 1872:

I have used them exclusive of all others for three years past. The purifying surface I find to be nearly *three times that of any other tray*, and their durability has been perfectly satisfactory.

H. A. Allyn. of Brooklyn Gas Works, says :

I have had them in constant use for over two years, and consider them superior to any gas tray made in this country.

Col. J. H. ARMINGTON, Superintendent of Providence (R. I.) Gas Works, after trial of these screens in all his purifiers, says :

The amount of gas purified per bushel of lime (slacked) is six thousand five hundred and fifty-six cubic feet.

GEORGE DWIGHT, of Springfield Gas Works, says, under date March 5th, 1872 :

Your screens we have had in use *two years*. They give good satisfaction and wear well.

J. M. COX, of New Haven Gas Works, says, under date 4th March, 1872 :

I have used iron and wood screens of different forms, and *none I have ever seen are equal to yours*, as the gas passes through them under much *less pressure*, and they *purify more gas per bushel of lime.*

We will send a sample screen to any company ordering it, delivering same free to any Express Company in Boston.

We might give quotations from many letters. We give a list of some Gas-Light Companies using them.

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We are now prepared to contract for this class of Castings under the most favorable terms.

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GAS HOLDERS,

TELESCOPIC OR SINGLE.

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Experimental Meters and Standard Test Gas olders,

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[*Continued from page* 141.]

Iron may sometimes be made useful in a minor way. I once saw at Nottingham, where much good work is done with Dennett's concrete, the ceilings of a factory formed of sheet iron. This is useless against a body of flame from below, but it prevents sparks dropping down from above. And as the floors are saturated with oil, this precaution has, to my knowledge, been of much value. But this is an isolated case, and I confess that as a general rule I see no way of using iron anywhere with success, unless every part is protected from the action of the flames. In fact, the result really seems to me to be that the only secure protection from fire is a structure of brick arches on brick supports. Nothing else that I can call to mind will stand the effects of great heat and the action of flames; stone and granite fly to pieces, but good brickwork never does. Perhaps the strongest case of endurance against fire known of late years was that at Tooley street, where an immense range of cellars was filled with oil, which ignited. For weeks this oil was burning—a rolling sea of fire. The cellars were vaulted with brick. They had this glowing mass below and the heated *debris* above, and yet after a careful scrutiny, when the oil was got out, I could detect scarcely a trace of injury. If this mode of construction cannot be used, I would trust strong wooden timbers thickly pugged and supported on strong wooden posts, in preference to iron girders on iron columns. But I cannot repeat too strongly, that, with a large mass of fire, no construction, under any circumstances, could be considered as really fire-proof, except solid arches on brick supports.

Compressed Air in Mines.

According to a German correspondent of *Engineering*, an extensive use of compressed air begins to be made in Continental mines, chiefly for boring machines, coal-cutting machines, for raising stuff, and for lifting water. The mines of Westphalia, Friedrich, Wilhelm, and Tremonia have since then introduced the Sachse boring machine for sinking shafts and winzes. These machines are built and provided with air-compressing machinery by the Humboldt engine-works, formerly Sievers & Co., at Kale, near Cologne—a firm which, during 15 years, has almost exclusively produced machinery for the purposes of mining, smelting, dressing ore, salt, phosphorite, etc. Coal-cutting machines, such as Firth's and others, are gradually finding their way to our collieries. At some pits of the Wuron district, near Aix-la-Chapelle, compressed air is occasionally used for raising water, and the contrivance is exceedingly simple. It consists of a closed iron cylinder about 5 feet high and 2½ feet diameter, which is provided with a valve at the bottom, and placed on the bottom of the shaft. Through the top goes a pipe from the surface to near the bottom valve, and there are besides one inlet ond one outlet pipe for the compressed air connected with the cylinder. When this is filled with water through the bottom valve, air is admitted, which presses the water in the first-mentioned pipe upwards through a common pump valve; then the air is allowed to escape by the outlet, whed instantly the cylinder fills again with water, and the compressed air is turned on anew. Thi: exceedingly simple machine is very usefol, though not very economical, as compressed air is still rather expensive; however, one such machine requires only one man to handle it. It does at the mines of the Wuron the work of fifteen men employed on hand-pumps.

RECENT AMERICAN PATENTS.

Pertaining to the Specialties of this Journal, to date ending April 27th, 1872.

124,929.—Water Tube Steam Boiler—C. G. Beitel.
125,042.—Gas Burner—S. Gardner.
124,993.—Hydrocarbon Burner—S. J. Whiting.
125,085.—Apparatus for Carbureting Air—G. Reznor.
124,897.—Flexible Gas Tube Support—A. Honsinger.
125,045.—Apparatus for Manufacture of Coal Gas—A. M. Giles.
124,895.—Steam Water Ejector—Habermehl & Kleiman.
125,337.—Gas Burner—S. W. Pingree.
125,195.—Carbureter—H. Holton.
125,166.—Gas Engine—G. B. Brayton.
125,619.—Extension Tube for Chandeliers—E. Russell.
125,496.—Gas Apparatus—J. H. Steiner.
125,683.—Manufacture of Illuminating Gas—P. H. Vander Weyde.
125,581.—Water Cut Off—W. H. Lilley.
125,408.—Steam Water Elevator—E. Reese.
125,733.—Dip-pipes in Hydraulic Mains for Gas Works—J. Hannan.
125,793.—Water Meter—De Nevarro and Sergeant.
125,662.—Water Wheel—J. C. Clime.
125,730.—Water Wheel—J. A. Fairbanks.
125,742.—Rain Water Cut Off—T. Lee.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

April 16, 1872

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Ince Hall	$13 00	@	13 50
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Block House—At Mines, $1 50, Gold			6 25
Little Glace Bay—At Mines, 1 60 Gold			— —
Pennsylvania Coals.			
Penn Gas Coal—Delivered in New York	$6 87½	@	7 10
Westmoreland	6 87½	@	7 10
Shafton	7 10	@	— —
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MurphyRun	$6 75	@	0 00
Despard	6 75	@	0 00
West Fairmont	6 87½	@	7 00
American Gas Coal	6 62½	@	6 75
Fairmont	6 75	@	0 00
Newburgh Orrel	6 75	@	0 00
Pinnickinick	6 75	@	0 00
Cloverhill of Virginia	5 25	@	5 50
McKenzie Compound Mixture			8 00
American Cannel Coals.			
Peytona of West Virginia	$14 00	@	14 50
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American Cannel	$10 00	@	10 50
Asphalts.			
Albertite of New Brunswick	$18 00	@	18 00
Ritchie Mineral of West Virginia	16 60	@	16 00
Trinidad Bitumen	— —	@	14 05

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GAS BURNERS, APPARATUS, ETC.

American Meter Co.—West 22nd st., N. Y., Arch and 22d st., Phil., 23 West st., Boston ... 6
Agency for the Gibson Improvement—W. H. Grenelle, 41 Pine street, N. Y. ... 9
Cast Iron Gas and Water Pipe—Smith & Ellis, York and Meyer streets, Phila., Pa. ... 4
Cast Iron Gas and Water Pipes—R. D. Wood & Co., Philadelphia Pa. ... 7
Cast Iron Gas and Water Pipe—Henry G. Nichols, 14 Platt street, New York ... 5
Cast Iron Gas and Water Pipe—Jno. McNeal & Sons, 117 Broadway, N. Y. ... 1
Gas-Burners—C. Gefrorer, 259 Commerce st., Philadelphia, Pa. ... 6
Gas Purification—St. John and Cartwright ... 6
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry st., Philadelphia, Pa. ... 6
Gasometers, Etc.—Geo. Stacey & Co., Cincinnati, O. ... 2
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway ... 4
Gasholders, Etc.—Deily & Fowler, 39 Laurel st., Philadel. ... 4
Gas and Water Pipes—B. S. Benson & Son, Allentown, Pa. ... 5
Gasometers, &c.—Keystone Iron Works—2132 Filbert st., Philadelphia ... 4
Gas Apparatus, &c.—Blanchard & Arnold, Fourth and GFowler sts., Milwaukee, Wis ... 7
Gas Screens—American Gas Screen Manufacturing Co., Haverhill, Mass ... 1
Jersey City Gas Meter Works, 14 Morris st., Jersey, N. J. ... 1
Northwestern Gas and Water Pipe Co.—646 Wabash Ave., Chicago, Ill. ... 7
Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Avenue C., N. Y. ... 5
Patent Gas Exhauster—Smith & Sayre, 95 Liberty street ... 9
The Gibson Improvement—The American Coal Gas Light Improvement Co., 79 Water street, Boston, Mass. ... 3
The Gas Light Co. of America—Box 5220, New York city ... 4

GAS COALS.

Despard Coal Co.—Parmelee & Bros., Agents, 32 Pine st., N. Y. ... 4
Gas Coals—Bird, Perkins & Job, 86 South st., N. Y. ... 5
Grahamite or Ritchie Mineral—27 South Charles street, Baltimore, Md. ... 8
Ohio Gas Cannel—George Merryweather, 5½ Pine street, New York ... 3
The Newburg Orrel Coal Company—Chas. W. Hays, Agent in New York, Trinidad Building, 111 B'way, Room 7 ... 5

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Atlantic Dock Iron Works—Hoy, Kennedy & Co., Office 98 Liberty street, N. Y., P. O. Box 2348 ... 3
Cast-Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md ... 6
Continental Works—T. F. Rowland, Greenpoint ... 5
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Sons ... 7
Gloucester Iron Works—J. P. Michellon, Sec., 6 North 7th street, Phila., Pa. ... 1
Louisville Pipe Works—Dennis Long, cor. 9th and Water sts., Louisville, Ky ... 7
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman & Wilkins streets, Pittsburg, Pa. ... 5
Pascal Iron Works—Morris, Taskar & Co., Philadelphia ... 19
Providence Steam and Gas Pipe Co., Providence, R. I.—H. A. Branch, Agent ... 4

WATER METERS, PUMPS, ETC.

Aubin Water Meter—H. Q. Hawley, Albany, N. Y. ... 6
Cast Iron Pipes for Water and Gas—Riley A. Brick, 89 White street, N. Y. ... 6
Valves for Water, Steam and Gas—Ludlow Valve Man'g Co., 193 River street, Troy, N.Y. ... 5
Water Pipes, etc.—S. Fulton & Co., 412 Walnut st., Phila. ... 6

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, etc., 58 Goerck st., New York ... 8
Clay Retorts, Fire Brick, Tiles, etc.—Wilson & Gardner, Lockport, Westmoreland Co., Pa. ... 8
Cheltenham Fire Brick and Clay Retort Works—Evens & Howard, 100 South Eleventh street, St. Louis, Mo. ... 6
Jersey City Fire Brick Works—J. H. Gautier & Co., Greene Essex and Bergen sts., Morris Canal Basin, N. J. ... 8
Laclede Fire Brick Works, 107 North Levee, St. Louis, Mo. ... 8
Manhattan Clay Retort Works, 15th st., near Av. C, N. Y. ... 8
Philadelphia Fire Brick Works, Vine and 23d sts., Phila. ... 8
Retorts, Etc.—Geo. C. Hicks & Co., Baltimore Md ... 6

LAMPS, STOVES, PETROLEUM, ETC.

Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal ... 9

MISCELLANEOUS.

Architect and General Gas Engineer—William Farmer, 111 Broadway Room 91 ... 3
A Synopsis of British Gas Lighting—Jas. R. Smedberg, San Francisco, Cal. ... 4
American Journal of Science and Arts—Silliman and Dana, New Haven Conn. ... 7
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind ... 2
Curley's Improved Retort Setting and Independent Damper—Thos. Curley, Wilmington, Del ... 8
Fodell's System of Bookeeping—A. M. Callender & Co., 42 Pine st., New York ... 8
Journal of the Franklin Institute—Prof. W. H. Wahl, Franklin Inst., Phila., Pa. ... 4
On the Advantages of Gas for Cooking and Heating—Magnus Ohren, Lower Sydenham, London, S. E. ... 5
School of Mines, Columbia College, East 49th st. ... 5
Scientific and Chemical Expert—Prof. H. Wurtz, 26 Pine street, room 36, N. Y. ... 7
Screening Shovels—O. R. Butler, 126 Maiden Lane, N. J. ... 4
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y. ... 9

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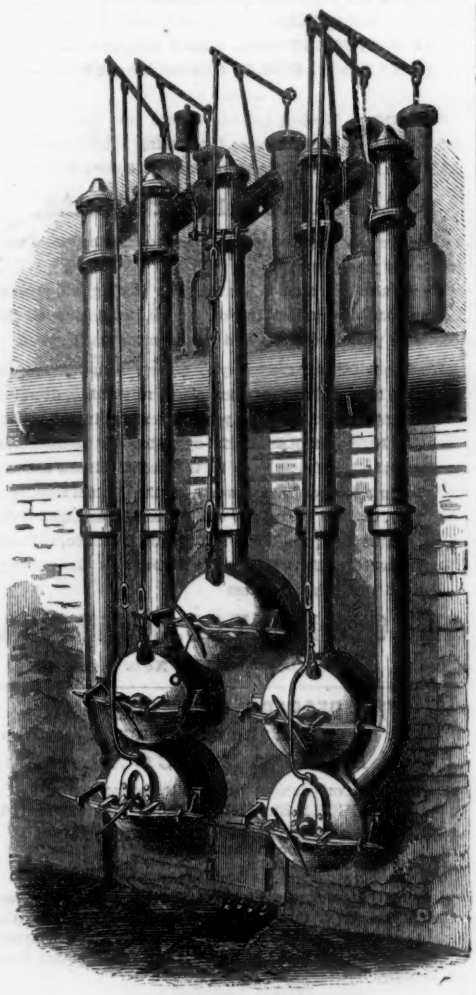

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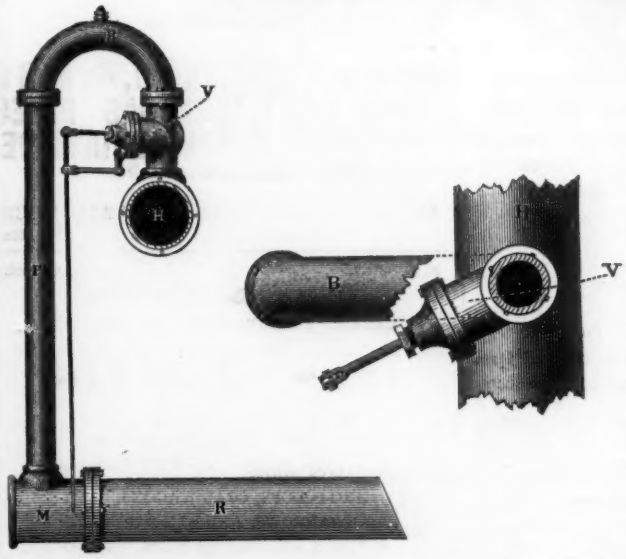

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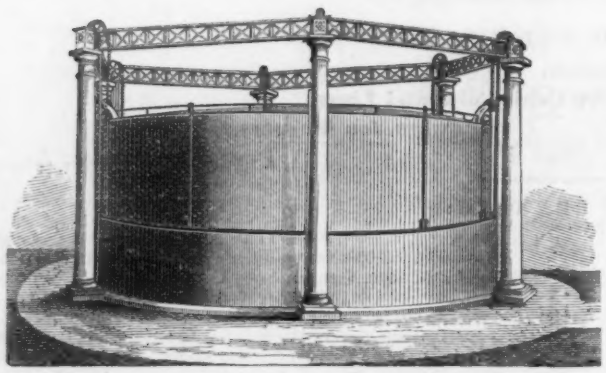

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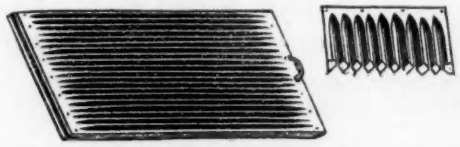

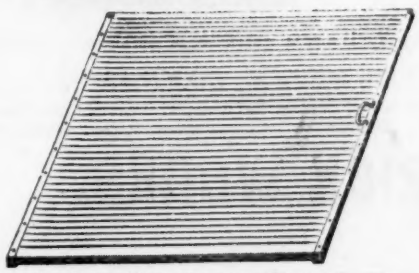

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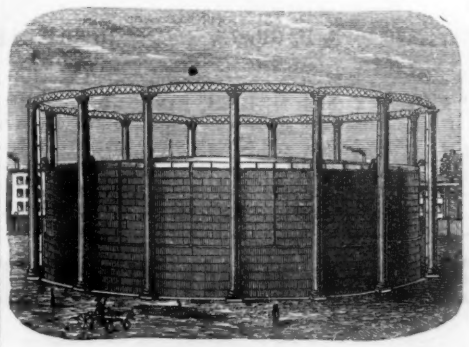

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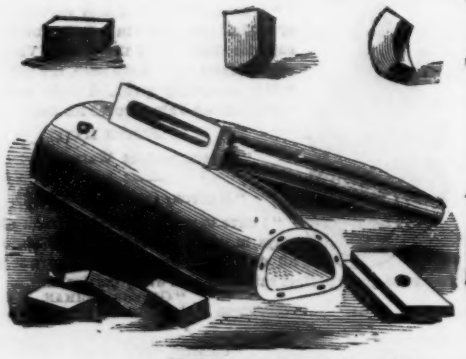

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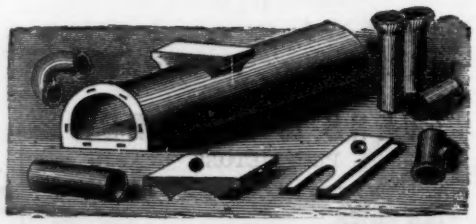

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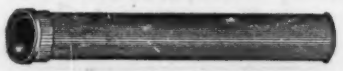

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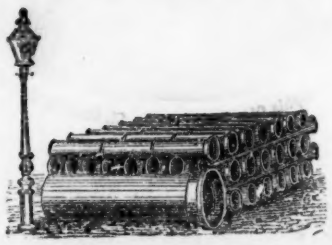

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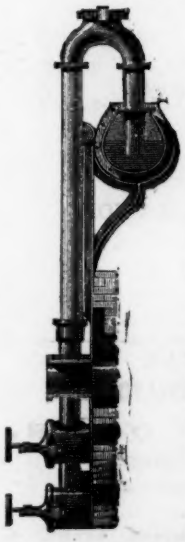

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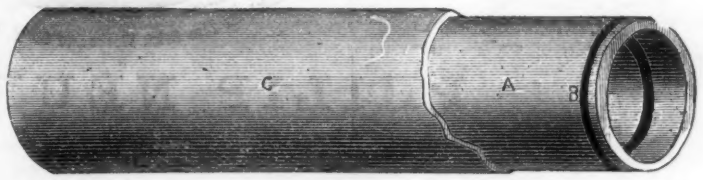

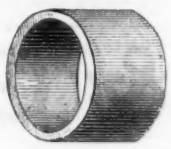

FIG. 2.

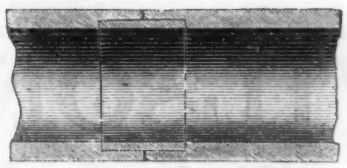

FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3.—Horizontal Section and Connection.

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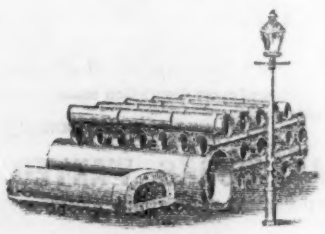

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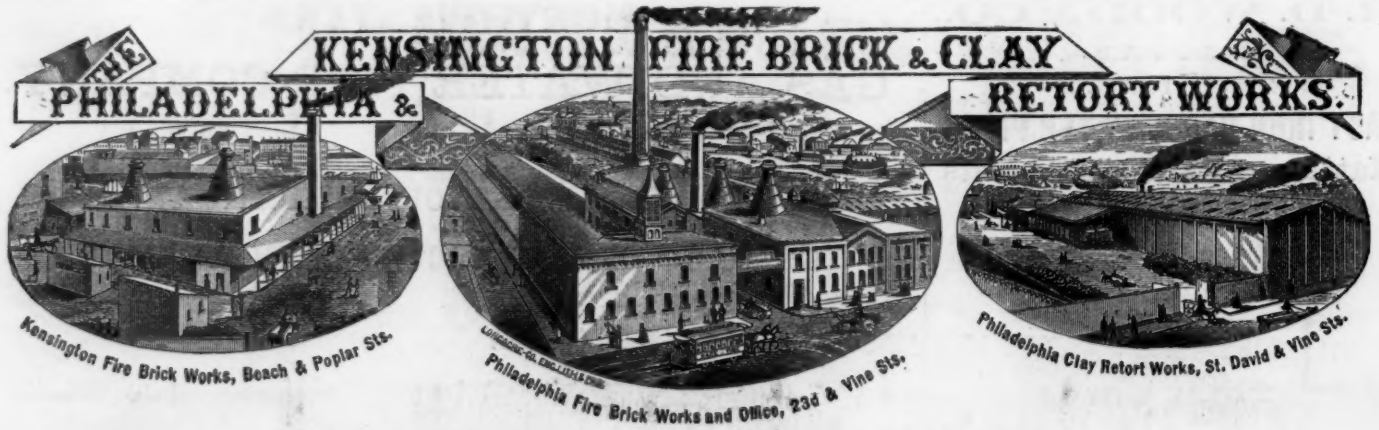
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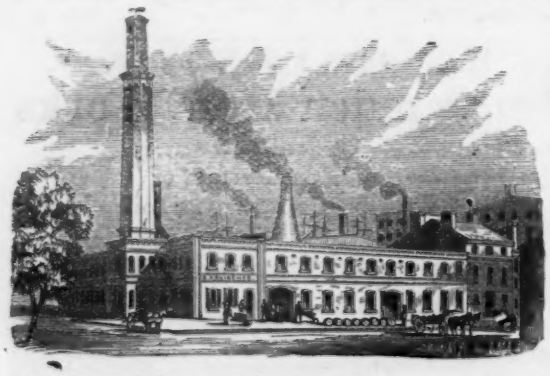

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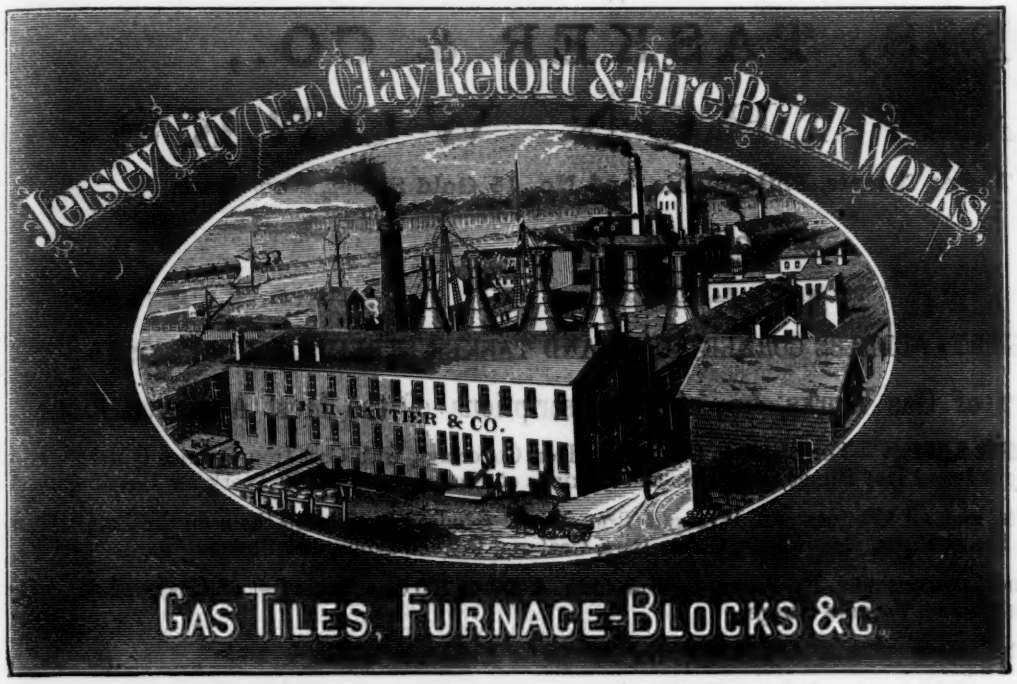

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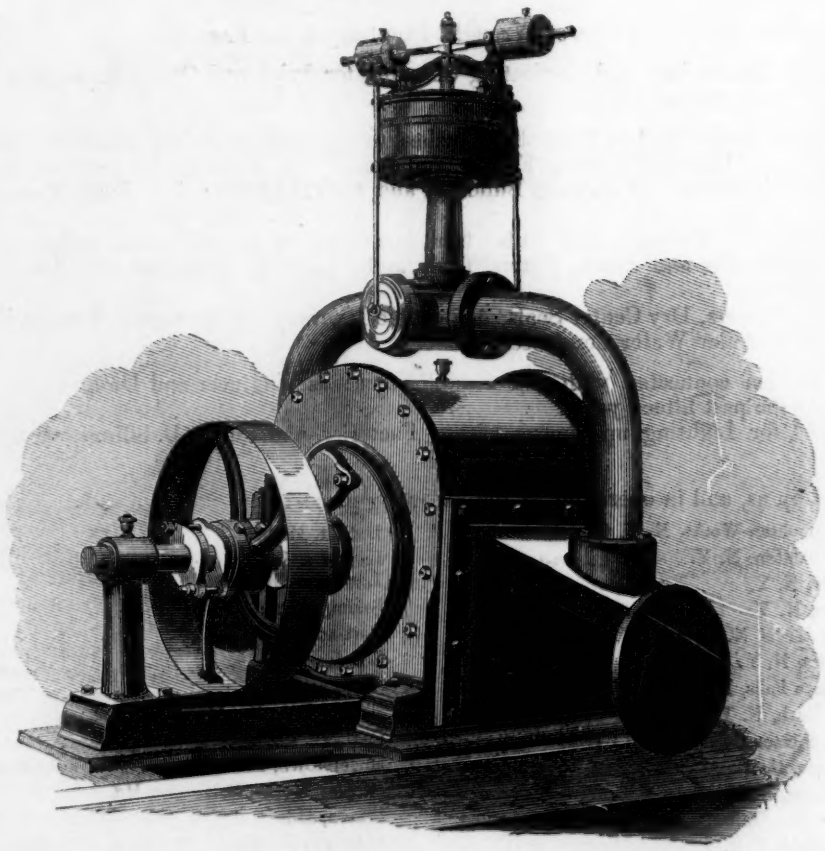

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